EUROPEAN UNIVERSITY INSTITUTE
DEPARTMENT OF HISTORY AND CIVILIZATION

Pedro Lains & Silva

FOREIGN TRADE AND ECONOMIC GROWTH IN THE EUROPEAN PERIPHERY: PORTUGAL, 1851-1913

Thesis submitted for assessment with a view to obtaining the Degree of Doctor of the European University Institute

Members of the jury:

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Pedro Lains

March, 1992

For my son

António

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"(...) present international differences in per capita income (...) are due only in part to differences in the rates of growth of per capita income during the period associated with the industrialization process of the advanced countries. In other words, the presently developed countries were already in advance of the 'rest of the world' when modern industrialization began (...)"[1]

"(...) [there] is the possibility of a causal connection between degree of development and distance. (...) The fact that the countries on the periphery of Europe tend to have less-developed economies (...) may be due partly to their being simply 'far away' from everybody that matters in trade."[2]

1. Kuznets (1956, p. 25).

2. Beckerman (1956, p. 37).

Introduction

When this study was started, my main purpose was to examine the thesis according to which Portuguese economic growth, during the second half of the nineteenth century, was hindered by an excessive export specialization in one product (wine) and one market (Britain). This is the dependence thesis. To pursue that objective it was necessary to compile the official data for foreign trade, to check for its accuracy, to construct aggregate series and to compute price and terms of trade indices. That data set is by far the major primary source on which the present dissertation is based.

Form the beginning, it was felt necessary to analyse the new trade series together with indicators for domestic output magnitudes and growth. After all, a crucial assumption of the dependence thesis, that Portugal had a high export specialization, implies a large share of exports in domestic output. A preliminary joint analysis of the output indicators and the new trade series led to the first conclusion that the

Portuguese economy was not so much "dependent" on the export sector as it had been hypothesized. This finding, together with the finding that some of the other basic assumptions of that thesis were not confirmed, led me to conclude that the framework of analysis it provides was not of great help for further empirical research. It is important to take into account, explicitly, the historiographical heritage. Yet, if the underlying assumptions do not fit historical facts, it may be more fruitful not to start from there.

With the new data for agricultural and industrial output growth and for foreign trade, the next step was to look for another theoretical framework. One such alternative framework is that of models of growth and trade provided by development studies for the post World War II period. According to these models, countries that historically had a wider insertion in the international economy managed to get better off. The underlying rationale is that exports allow for increasing product specialization, generate scale economies in production, and bring higher capacity to import technology and economic growth. It is worth noting that these assumptions are quite opposite to those of the dependence school, where autarcy and import substitution are seen as fostering growth through industrialization.

Export-led growth models, however, are not entirely satisfactory because they assume exports as an exogenous variable

that can be promoted by policy measures, independently of general domestic economic conditions. Yet exports do depend on the country's competitiveness, and competitiveness is a function of productivity levels. Generally speaking, then, the capacity to export depends on average labour productivity of the country and thus on GNP per capita.

These first theoretical digressions led to a central question which lies on the foreground throughout this study - What was the potential of the Portuguese economy to increase its pace of growth, and to converge to Western European levels of labour productivity and income per capita? This is a central question for the analysis of the contribution of any particular economic sector, because that contribution does not depend only on the potential of the sector to expand, but also on the potential for overall economic growth. Good politics can promote exports and exports can promote growth, if growth can be promoted.

Economic theory tells us that growth can be promoted in several ways. However, we observe that, historically, it is not possible to sort out the factors that led some countries to achieve higher levels of income than others. One thing we know now is that it is not possible to impute growth to single factors alone, and that similar policies may have different outcomes in different countries. Moreover, decisions over economic policies

are not exogenous to the economy at large. Conditions for growth - or for growth promoting policies - differ from country to country. The analysis of alternative policies and possible counterfactual stories needs to take into account the limits to growth.

Chapter 1 is an attempt to discuss and to measure the growth potential of the Portuguese economy. Firstly, it shows how different perceptions on Portugal's growth potential led to different historical interpretations of the performance of its economy during the nineteenth century, and before. Secondly, it shows that Portugal was by mid-nineteenth century one of the poorest countries in Western Europe. This low starting level of development implied that Portugal's productive structure and level of capital accumulation was not the best to introduce new and more productive technologies and forms of economic organization, developed either domestically or imported from more industrialized countries.

Chapter 2 is mostly a descriptive chapter of the growth of the agricultural and industrial output in Portugal from 1851 to 1913, as well as a presentation of the historiographical debate on Portugal's backwardness. Following the preoccupations expressed in chapter 1, there is no intention to find causes of growth or stagnation, but only to present its major features given by the new quantitative evidence. At the end of the

chapter, the issue of the contribution of the export sector to economic growth is raised. The election of that issue, however, does not imply that it is expected to find in the export sector a clue to understand Portuguese nineteenth century growth. The fact is that, at the present stage of research, it is necessary to isolate specific sectors to go deeper in the analysis.

Chapter 3 deals with the export sector. More importance is given there to the description of the conditions in international markets, than to a detailed analysis of the domestic production of exportables. There is a good lot of literature that points to the major constraints of the expansion of exports. According to that literature, goods for exports were badly produced, not standardized, and badly packed; moreover the successive governments failed to negotiate trade agreements with Portugal's major partners and potential new clients. Thus it is concluded that *if* goods were better produced and shipped, and *if* trade agreements were signed, exports could have expanded and growth promoted. The digression on the case of Scandinavia - that may appear displaced in a chapter on Portuguese exports - was necessary to avoid circular reasoning as the above. The success of those small countries shows that export growth depends on the capacity to adapt to changes in international demand. Changes in the composition of exports were accompanied by changes in the domestic economic structure. One sound hypothesis we may draw

from this example is that exports could have been promoted by growth, and not the other way round. The hypothesis that export growth can be limited by the capacity to increase domestic output is further explored by the study of two important Portuguese export branches - cork and wines.

Chapter 4, on the import sector, does not stem from the study on the export sector. This is a result of the present dissertation and not one of its methodological weaknesses (it is hoped). In fact, I have tried to look into the import sector for consequences of the observed slow export growth. However, no direct relation between export and import fluctuations was found. As such, to avoid frustrating conclusions, I have decided to study the import sector on its own and to look for further information that may help characterising Portuguese economic growth. The major conclusion of chapter 4 is that the Portuguese economy managed to find successive alternative sources of foreign earnings to pay for the needed imports. Thus the slowdown of export growth observed after 1886 did not affect import growth. This was important because economic growth in Portugal had a high import content.

Chapter 5 is the concluding chapter. In the present study to conclude meant to put together a sequence of partial results. No straightforward thesis to explain Portuguese economic growth from 1851 to 1913 is offered here. The one disadvantage of such an

option is that it renders more difficult to perceive and to discuss the results of the research. Yet that cost was preferred to the cost of following a strict model with strict conclusions of the negative kind, regarding what *did not* cause Portugal's development lag.

Acknowledgements

If the time I have spent doing this dissertation can be measured by the extension of the list of those to whom I am indebted, then it took *too* long. To start with, I would like to thank my advisors, Alan Milward, Patrick O'Brien and Jaime Reis. They have depicted every incongruence, every jump of reasoning, and unnecessary bridge paragraphs in the text. My English was also heavily tidied up. Maybe the end result is not too bad a proxy of what could have been done.

At the *Instituto de Ciências Sociais* in Lisbon, where the present study was started, I had a unique environment. I am grateful first of all to the Institute's late dean, Adérito Sedas Nunes. Among my friends and colleagues, those who have commented my writings and to whom I am specially indebted are Maria de

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I spent part of these years travelling between international conferences, where I could hunt for comments from James Foreman-Peck, Angus Maddison, Leandro Prados and Jeffrey Williamson, to whom I am also grateful.

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The dissertation is dedicated to my son António. From the age of five, he patiently flew on his own and for several times, between Lisbon and Italy. When we were together in Florence, he always let me keeping up with my working schedules. We had a very good time there. I am pretty sure that he was not aware of what I was doing in Florence, but one thing I know is that we shared the same passion for Italy.

This last line is for my ex-wife, Luisa, to whom I am grateful for many things.

CHAPTER 1

THE PORTUGUESE NINETEENTH CENTURY GROWTH POTENTIAL RECONSIDERED

1.1 - Introduction

To write on a country's history is a task loaded with an influence from past historiography. The issues that we elect for discussion and further investigation tend to be the same that have been elected over time by other historians and analysts, and there is no easy way to break this chain. Yet, one may wonder if that is at all essential. My departing point here is not different from that of most historians who have studied nineteenth century Portuguese economic history: I shall try to understand why Portugal was a poor country within Western Europe.

However, it was found necessary to specify and discuss some assumptions regarding the possibilities for alternative paths of

development, implicit in most economic history books on the country. One of the most important and which will be addressed in this chapter, is the evaluation of Portuguese economic growth potential. There is a general feeling that Portugal could now be a much richer country than it is. That idea stems from perceptions of a Portuguese age of greatness from which the country has been decaying for the last three or four centuries.

To measure properly a country's growth potential is not an easy task because it would involve a complete counterfactual macro-economic model. My approach here is just a first attempt, and it is based on inferences drawn from international comparisons. Section 1.3 presents a measure of Portugal's growth potential based on the idea that the possibilities of development are not independent from the national economic conditions of the period in which industrialization started. Before that, in section 1.2, I discuss Portugal's historiography in order to ascertain the extent to which it has been influenced by the idea that in the nineteenth century the economy was decaying. A cursory comparison with the Swedish historiography tries to make the point that, unless we assess and talk about potential and growth in their proper historical context, historical explanations become teleological. In other words, descriptive elements of a country's economic growth are turned into causes of either stagnation or growth, depending on the assumption of whether the country is decaying or not.

1.2 - The historiography of decadence

Contrasted with the glorious image, quite common in Portuguese historiography, of the period of Overseas discoveries, expansion and colonization (which lasted from the fifteenth to the eighteenth centuries), it is not surprising to find that the nineteenth century history of Portugal is presented as one of economic and social decline. The evident economic backwardness of Portugal (in relation to other Western European countries) during the second half of the nineteenth century, has been explained in terms of social and political impediments to development, which implicitly assumes that Portugal failed to fulfil some unrealized potential for economic growth. The reasons for that failure, as well as the idea that there was a high economic potential, originate in the contrast drawn by historians between the post-imperial period following the loss of Brazil (starting in 1808-1810), and their perspectives on the country's previous economic history. A recent work poses the question in a most straightforward fashion: "With such a prosperous beginning, with such tremendous resources for industrialization, why did not Portugal generate self-sustained growth?"[1]

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1. Schwartzman (1989, p. 28).

Some authors would argue that the structure of the Portuguese economy was negatively affected over the long run by an excessive concentration upon trading activity and a significant loss of human capital, due to emigration to the Empire. Strong connections between a colonial past and Portuguese decline is clear for instance in the following words of Joel Serrão:

> "*all* of our economic life (as well as social and cultural life) was conditioned not only by the gigantic effort made in the colonization and exploration of the vast Brazil, but also by their fruits - sugar, gold, cotton, etc. (...)".[1]

Sérgio (1924), who more than any other author is responsible for popularizing the view that Portugal had diverted far too large a share of her resources to colonization and imperial expansion, edited three short texts of seventeenth century Portuguese economic writers who put forward the same general view for their own times - the sixteenth and seventeenth centuries. Sérgio's own re-interpretation of the writings of these authors was presented in a most eloquent form and, despite the fact that his thesis had been previously defended by authors such as Antero de Quental, Oliveira Martins, Basílio Teles, and Alberto Sampaio, it was Sérgio, who declared himself not to be an historian, that

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1. Serrão (1978, p. 10) ["*toda* a nossa vida económica (e a social e a cultural também) foi condicionada não só pelo esforço gigantesco levado a efeito na colonização e na exploração do vasto Brasil, mas também pelos seus frutos - o açúcar, o ouro, o algodão, etc."].

directly most influenced Portuguese historiography.[1]

For Sérgio, Portugal's main problem over the centuries were the persistent lack of political and economic interest in the metropolitan area, in contrast to the large volume of resources devoted to commerce with Asia and Brazil. In other words, Portuguese resources had been "wasted" in peopling the colonies and in carrying and financing inter-continental trade. According to the same author, these developments were the consequence of what he has depicted as "transport" or "carrying trade" policy, a policy that promoted trade activities based on the products of the Empire. This he considered as the opposite of what Portuguese economy missed since the fifteenth century: a "settlement" or "production" policy, a policy that might have provided the stimulus for the optimal development of the nations' industrial and agricultural resources, fixating labour and capital to the land. Instead, Portugal lived on the money earned successively by its Empire: gold from the Mina, specie from India, gold and diamonds from Brazil, and later, in the second half of the nineteenth century, the money earned from its emigrants and from

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1. See Quental (1982), Oliveira Martins (1954) Basílio Teles (1901) and Alberto Sampio (1923). The sources of Sérgio's inspiration are clearly seen by comparing with Teles (1901, p. 22), although his inspiration can be traced backed to Antero de Quental and Alexandre Herculano, as he recognizes (Sérgio, 1924, p. xlviii-xlix). See also Valente (1980, pp. 84-86) and Serrão (1970, p. 25). Although Sérgio (1980, p. 263) declares himself not to be an historian, his essays on history allow me to call him that. Sérgio's influence on our contemporary historians is explicitly recognized by authors such as Saraiva (1972, vol. 1, p. 11), and Godinho (1968, vol. 1, p. vii). Pereira (1979, pp. 50-72) is also clearly inspired by Sérgio. For a short commentary on Sérgio's influence on Portuguese historiography see Bonifácio (1989a).

easy borrowing abroad. But the most serious consequence of all this was that the country acquired a certain type of "social mentality" that did not favour productive activities. Thus Portugal had during "seven centuries of its history" an educational system that did not foster a "school for work".[1]

This Portuguese historiography that traces the historical origins of decline, implies some kind of organized political power or institutional system which could over time have chosen one policy rather than another and have implemented it effectively.[2] Yet Sérgio's assumption of the state having had the capacity to intervene, historically, in the shaping of the structure of the Portuguese economy, could not hold up to a detailed historical examination. And that assumption is crucial for him because according to his perspective, the rate and pace of structural change was determined by policy, in particular by

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1. See Sérgio (1924, pp. xix-xx), (1972, p. 69-70) and in relation to the nineteenth century Sérgio (1972, pp. 137-38). Quoting the original: "Podemos chamar às duas escolas (...) a 'política da fixação' e a 'política do transporte'; a política da produção e a política da circulação; a política da estabilidade e a política do aventureirismo; a política nuclear e a política periférica; a política de D. Pedro e a política de D. Henrique; a política da boa capa e a política do mau capelo." In Sérgio's words commerce and transport are also associated with adventurism, whereas settlement and production are associated with stability. A related dichotomy, protectionism vs. free-trade, is proposed by Bonifácio (1989a, p. 134). On the theme of Sérgio's interpretations of the role of education, see Valente (1980).

2. This is precisely what *mercantilists* expect from the State. According to Blaug (1990, vol. 1, p. 48), a major purpose of the mercantilist school would be to justify the increase of the power of the central State. This idea is basically taken from Heckscher, who according to Gerschenkron (1954, p. xxxvi), may have failed to note that *laissez-faire* policies could also be related to the increase in State power. See on the rise of mercantilist ideas in Portugal, Cardoso (1989, pp. 67-69).

the "transport or commercial" policy emanating from a central power and successfully transmitted to the economy at large. There is no attempt in Sérgio's work to ascertain whether the economy had the capacity or the potential to respond to the hypothesized stimulus.[1]

Thus, Sérgio's popular interpretation raises the whole problem of supposedly autonomous political power and the extent to which economic policies emanated from that power can be successfully implemented. It may be that institutional change is not an autonomous process, if it depends on changes in the economy, as, for instance, changes in the rate of savings and capital formation, as North (1981) would argue.[2] Sampaio (1923), for instance, is well aware of the interaction between institutions and economic conditions when he argues that over time Portugal's institutions adapted to economic change. But Sampaio only displaces the argument. According to him, the fact that political power in Portugal was not autonomous, was a consequence of the inability of the society to act in an organized and aggregated form and with common political ideals.

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1. Bonifácio (1989a, p. 138) is apparently in disagreement with this interpretation of Sérgio's work. In fact, according to her, Sérgio does not say that the "transport policy" was dictated by economic interests of any social groups. Yet a few lines below Bonifácio states that Sérgio saw history set in motion by men, and men set in motion by economic interests.

2. See North (1981, p. 208).

Thus, Portugal was, "(...) no doubt, an exception in Europe."[1]

Portugal could be an exception, but the present discussion is by no means peculiar to the country. Interestingly enough, this same point has been made in a similar fashion by Fenoaltea (1968), when discussing the works of Alexander Gerschenkron and Rosario Romeo. According to him, these two historians of the Italian industrialization could be "poles apart in their assessments of the contribution of public policy to the Italian industrialization." But both postulated a "stage mechanism wherein growth is held up by a pervasive industrial supply bottleneck until the prerequisite structural change sets off the industrial revolution, big push, or whatever."[2]

The general view of economic growth led by the state ignores the alternative perspective according to which economic agents were attempting to seize the available opportunities to make profits, and that the state would not have enough power to control or direct their activities. Institutional factors do matter, but it is not likely that over the centuries they can shape individual action in one direction or another.[3] Possessing the technology and the opportunities to exploit gains from trade over the Atlantic and the Pacific oceans, it might have been

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1. Sampaio (1923, p. 445). [Ela constituí sem dúvida uma excepcção na Europa.] The author is not referring to a specific period, but to the whole period following the discoveries.

2. Fenoaltea (1968, pp. 8-10).

3. The key reference regarding the role of institutions in economic growth is North and Thomas (1973).

probably inefficient to leave these opportunities to third countries, in order to concentrate resources within the Mediaeval boundaries of Portugal. And it might also have been difficult to arrest that drive, especially if overseas discoveries and expansion were in fact a continuum of the Christian *reconquista* within the Iberian peninsula, as Jones (1981) argues, or if they were motivated by a quest for grains because of insufficient domestic supply, as Godinho (1944) or Marques (1968) hypothesized.[1] State action could probably not do much in diverting resources from "commerce" to "production", to use Sérgio's words.[2] Although constrained by the institutional environment, individuals were probably acting according to the information available to them, which was probably scarce. To assume that the State could have fostered the economy to grow in another scenario is quite a strong assumption, which is not deal with by Sérgio or other authors of the same vein.

The Discoveries were in fact an adventure and nobody could guess what economic gains could be derived from the new lands.[3]

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1. See Jones (1981, p. 75), Godinho (1945), and Marques (1968, pp. 236-37).

2. For a view on the capacities of the states to foster economic development in Early Modern and Modern Europe, see Jones (1981, pp. 104-26).

3. Arrow (1969) - who has attempted elsewhere to specify the competitive paradigm according to which individuals when maximizing their welfare may attain Pareto efficiency - argues that this was one case when "theory should not take place of history" because, although economic factors could have motivated the Discoveries, the fact is that "the brute, though unknown, facts of geography determined what in fact was their economic result." (Quoted by Jones, 1981, pp. 79-80). See also Arrow (1974) and the review of the competitive paradigm in Kennedy (1987, pp. 4-6), which is discussed in chapter

We can assume however that the gains ended up to be enormous for Europe as a whole. But unfortunately there are no attempts to quantify the net benefits that Portugal draw from the Discoveries and Expansion. Thus, until that is done and we can have a more clear idea of the level of Portugal's economic conditions in comparison to other parts of Europe, such as the Flanders, the Northern Italian states or even England, it is better to analyse the more recent times independently of our perceptions regarding the Modern Age.

An illustration of how historical analysis is influenced by the idea of decline, as opposed to growth, can be insightful and justifies further this preoccupation with the historiographical heritage. For that purpose we compare now the writings of Eli F. Heckscher (1879-1952) on Sweden, and António Sérgio (1883-1969) on Portugal. Both writers aimed to understand economic development in their own times, and both studied their nations' history back to the late Mediaeval period, in order to search for a broad *structural* historical perspective. As mentioned, Sérgio focused on the conflicting benefits of two different policies, the *transport* or *carrying trade* policy and the *settlement* or *production* policy. Heckscher's historical analysis constantly refers to the gradual development from what he calls a *storage*

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contd.

5 below.

economy to a modern market economy.[1] My main purpose in comparing the histories of these two authors is to reveal the influence of different economic environments upon historical interpretation. Heckscher wrote at a time when Sweden was clearly one of the most successful countries in Europe, while Sérgio was steeped in a historiography of decline. Their respective positions led to different interpretations of the long term consequences of broadly similar set of historical facts.

For instance, both authors observe that throughout the eighteenth century their countries external trade was largely dominated by foreigners - Hansards and the Dutch in Sweden and the British in Portugal - but the consequences of this domination are interpreted in radically different ways. For Hecksher this "passive trade" exercized positive effects upon the Swedish terms of trade because prices would be set in its ports and foreigners would then have less bargaining power because they would have to sell their merchandise at reasonable prices.[2] The same trading regime is however perceived as a major disadvantage for Portugal and Sérgio argues that British dominance of Portuguese foreign trade involved a loss of revenue for Portugal. Both conclusions

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1. Probably due to its political position and to the lack of freedom of press in Salazar's Portugal, Sérgio did not complete his projected History of Portugal, having only published a first volume, dealing with geographical and natural constraints. E. Heckscher published in 1935-1949 (in Swedish) *Swedish Economic History from the times of Gustav Vasa* (5 vols.). In spite of this, there are still grounds for comparison because the two authors resumed their perspectives in Sérgio (1929) and Heckscher (1954).

2. Heckscher (1954, pp. 47, 63 and 66).

are theoretical, and are not grounded on research into terms of trade or the balance of payments.[1]

Another example concerns the level of trade concentration in both countries. To Heckscher that appears as an expected consequence of the available natural resources in Sweden, while Sérgio stresses that concentration was a manifestation of Portuguese *dependence* vis-a-vis Great-Britain. Other examples of differences of the significance attached by the two authors to other descriptive elements common to the two countries, such as the low level of urbanization, or the high fragmentation of the land. To put it bluntly, according to Sérgio, Portuguese backwardness was a *consequence* of those elements (among others), whereas according to Heckscher, Sweden developed *despite* those descriptive elements.[2]

The different historical interpretations of the two authors mentioned above may reflect different ideological points of view. Hecksher believed in free markets, while Sérgio's ideas favoured state intervention in the economy, and this may go far in

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1. Valente (1980, p. 87) makes the same point regarding the work of Sérgio.

2. See Heckscher (1954, pp. 138-39, 142, 144-45 and 153) and Sérgio (1929) and (1972). Some of these examples are only referred by Sérgio in passing, and the importance they reached in our historiography is largely due to historians whom he influenced, as Magalhães Godinho, Joel Serrão or Miriam Halpern Pereira. Referring to the industrial development in the second half of the eighteenth century, that Macedo (1982) has identified, Pereira (1986, pp. 286-87) concludes that it occurred *despite* the Methuen treaty of 1703, and because in that century Portuguese foreign "dependence" was "commercial" and not "industrial". The influence of António Sérgio is clear. In the nineteenth century dependence turned to be "industrial" thus explaining to a large extent, according to her, Portuguese economic backwardness (for a critique of this author's views on the nineteenth century see the next chapter).

explaining the importance he gives to the role of the state in his historical analysis. Sérgio was never worried in checking the implications of the mercantilist ideas of the seventeenth century authors he revived, whereas Heckscher refuted the basic assumptions of the mercantilist school of thought because, according to him, they were not built on the observation of the facts.[1] Yet, it is interesting to note that both authors were involved in politics, although Sérgio was an opponent of the ruling dictatorial regime, while Hecksher was directly involved in policy making for Sweden.[2]

Moreover, these different interpretations may also reflect real differences in the facts that are only apparently similar. It may be true that foreigners who came to the Swedish ports had a lesser bargaining power than those that came to the Portuguese ports, because the demand for Swedish iron could be less elastic in respect to prices than the demand for Portuguese wine. But that would go in accordance with the point I am trying to make here. Sérgio takes the descriptive element of the presence of foreigners as a causal factor with negative consequences, whereas the true factor could lie behind, in the shape of the demand

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1. Blaug (1990, vol. 1, pp. 50-51). On Blaug's critique of Heckscher see Gerschenkron (1954, p. xxxv).

2. Political involvement, together with the preoccupation in explaining the long-term economic evolution, that characteirze both Sérgio and Hecksher, are typical of what Hartwell (1973) has designated the "good old economic historians".

curves for exports, and it is not even mentioned.[1]

The perception of economic history appears as crucial for historical analysis. In this respect, it is also interesting to note that authors such as Astrom (1973) argue that Sweden, even during its *Age of Greatness* in the seventeenth century (1632-1697), when it controlled large parts of the Northern Europe, was far from being a great economic power. According to him:

> "Despite all her attempts to present a splendid appearance to the world, Sweden was during her Age of Greatness, a poor country" and "waged her wars not with her own armies or at her own expense, but (at least in part) with German mercenaries paid by French subsidies."[2]

And Astrom's conclusion exemplifies well my departure point here:

> "The correlation of economic and political factors can indeed be a tricky business, as an attempt to analyse Sweden's status as a great power, and her subsequent collapse, sufficiently reveals."[3]

It is my conviction that Portuguese real economic potential

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1. This example calls the attention of the possible importance of the contribution of natural resources. However it should be recalled that natural resources is not a pure gift from nature: they have to be explored, for what investment and transport facilities are needed. If these complementary factors are not taken into consideration, it is hard to explain why some countries developed their natural resource basis and others did not. This theme is further discussed in chapters 2 and 3.

2. Astrom (1973, p. 73).

3. Astrom (1973, p. 101). Another example of how the simple association of historical facts can be misleading, is the historiographical debate on the consequences to the Danish economy from the loss of the Duchies to Germany in 1864. Contrarily to what one could expect from Portuguese historiography vantage point, the loss of territories is considered by some Danish historians as a positive element for the Monarchy's "industrial boom " that followed the Three Years War. Hornby (1969), however, casts substantial doubts on the causal relation between these two contemporary historical facts.

during its own glorious period has not yet been properly defined and measured. And it is my conviction too that the hypothesis that Portugal was not an economic power in those centuries is most plausible and that it is worth exploring further. If that is the case, then the idea of decadence should be revised. However, the present work does not aim at such a revision. My only concern here is to show how putting aside the idea of decadence can lead us to redirect the research on Portuguese nineteenth century economic history.

A second comparison of the Portuguese and Swedish economic historiography, now referring to the nineteenth century, may further illustrate this point. That comparison concerns two articles that again analyse similar historical facts: the failure of the attempts to raise foreign funds to finance the construction of the first railway lines in Portugal and Sweden.[1] These attempts, that took place in 1845-46 and 1853-54, respectively, came at a moment when capital was again available for international loans, in London, Paris, Hamburg or Amsterdam, and when the governments of peripheral countries of Europe, like the Swedish and the Portuguese, were trying to raise long-term loans for funding investment in social overhead capital. Soderlund (1963) concentrates mainly on a

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1. See Sõderlund (1963) and Vieira (1985). The first railways were to be inaugurated later on in very close years: 1854 in Portugal and 1856 in Sweden.

> "narrative (...) intended to illustrate the nature of the difficulties confronting a small, little known and industrially underdeveloped country (...), endeavouring with this inadequate organisation to lay the foundations of a new government credit structure."[1]

While the Vieira (1985) article is more general, because the author aimed to

> "understand the structural components of railway funding in Portugal during last century, of which government policy, scarcity of resources and financial dependence on European capital markets are probably the more significant".[2]

For Portugal the reasons offered for failure are "structural": the fragility of the political institutions caused by the turmoils of the period from the first French invasion (1807) until the relatively more stable first government of Costa Cabral (1842-1846); the lack of economic reforms, in order to "exploit the internal economic potential (...) given that from the Empire, Brazil, only nostalgia was left"; and the lack of credibility on the external capital markets, as a consequence of problems with servicing the debt.[3] In contrast, the reasons for failure to fund the loan in the Swedish case are considered as a normal consequence of

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1. Soderlund (1963, p. 44).

2. Vieira (1985, p. 125). ["perceber quais as componentes estruturais do financiamento ferroviário em Portugal no século passado, de que a política governamental, a escassez de recursos e a dependência financeira em relação aos mercados de capitais europeus são, talvez, as mais significativas."]

3. Vieira (1985, p. 126-28) ["explorar o potencial económico interno (...), já que do Império, o Brasil, só restava a saudade"].

> "the paucity of the Board's [i.e. National Debt Office] acquaintance with conditions on and the organisation of the capital market; lack of initiative; and inadequate appreciation of the fact that these new tasks demanded methods of working other than the traditional ones."[1]

Again different reasons are put forward to explain rather similar historical facts in the two countries. For Portugal the causes of the failure to obtain external funds are related to the imperial heritage. For Sweden this particular failure is related to a "natural" lack of experience of Governmental officers and institutions.

Although the creditworthiness of the two Governments was considerably different (Sweden's external debt was insignificant, while Portugal had already defaulted) the relevant consideration might have been the information available to foreign creditors. Thus, in contrast to Vieira's emphasis on credit ratings, Soderlund noted the disinterest of foreign investors in the Swedish loan and concluded:

> "All the evidence indicates that it signified little that the Swedish Government was in the unique position to be almost unencumbered by debt and that the loan was to be used for productive purposes. Swedish Government bonds were, as Hambro [a London banker] puts it, 'an entirely unknown quantity on the capital market'."[2]

Similarities between Portuguese and Swedish economic history in these years are probably not profound. But, given that neither Sérgio or Heckscher, nor Soderlund or Vieira provide definitive

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1. Soderlund (1963, p. 55).

2. Soderlund (1963, pp. 58-59).

quantitative evidence, the perceived and hypothetical consequences of similar problems are significantly different. This seems to be so because the Swedish historians are concerned with an economy that became "successful" in the late nineteenth century, whereas Portuguese historians study one of the poorest economies of nineteenth and twentieth century Europe. The differences reside in the search for reasons for success and failure.

The point that these comparisons make clear is that it seems necessary to provide a yardstick to measure, however crudely, the "potential for growth", which should be defined in terms of the period under analysis, thus avoiding references to past periods for which our economic knowledge is scanty and thus can be biased. The question - "Could Portuguese economic growth and structural change have been more rapid between 1850 and 1913?" -, is of central importance. It is the gap between actual and potential economic growth that is the heart of the discussion of the political and social history of Portuguese decadence. The importance of social and political explanations for backwardness is then in direct proportion to the size of the gap. My point of departure is not a long term historical comparison between periods that historiography has pictured as of the rise followed by the decline of the Portuguese economy; instead I will look at the economy as it evolved between 1850 and 1914 and analyse its successes and failures in exploiting the opportunities of those years. For that purpose it was necessary to use a yardstick to

measure the real possibilities for economic development during that period.[1] And I will ignore the counterfactual heritage of missed opportunities for earlier centuries. In the next section I attempt to assess the potential for economic growth in Portugal in the years from mid-nineteenth century to the outbreak of World War I.

1.3 - An evaluation of the Portuguese growth potential, 1850-1913

The evaluation of economic growth potential is an exercise in conterfactual, quantitative and comparative economic history. The aim must be to find an alternative path of growth, assumed as being within the reach of a particular country for a given period, and which would lead to higher rates of economic growth. The posited alternative pattern can only be abstracted from the historical experience of more successful economies operating within a comparable social, political and geographical context.

The obvious framework for this comparative exercise is total factor productivity analysis, related either to particular economic sectors, to certain factors of production, or to a

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1. A most recent work which departs from a similar perspective is Kennedy (1987, Chap. 1).

general indicator like gross domestic product. Modern economic growth in the Kuznetsian sense may be defined as the shift of resources from less to more productive sectors.[1] In the perspective of the economic history of the last two centuries, that shift is identified with industrialization, i.e. the shift of resources to the industrial sector. Thus a comparison of productivity levels of the Portuguese industrial sector with those of a more "successful" country - which had similar initial economic conditions by way of natural resources, the size of the national economy, or a comparable geographical position relative to international markets - could provide a first fruitful approach to the problem of measuring growth potential. The point is to estimate gains in productivity that might have been achieved by a more modern and efficient industry. The comparison of the industrial structures would probably reveal how higher efficiency or productivity standards had been achieved in the successful country.[2]

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1. Kuznets' definition of modern economic growth is mostly known for these two characteristics. Nevertheless he adds a third one which is of much importance in the context of the present chapter: the *international spread* of modern economic growth. See Kuznets (1973, pp. 248-50), and also Kuznets (1966, Chap. 10).

2. This is the approach developed by Kennedy (1987) in an attempt to evaluate late Victorian economic performance, namely in the period of British climateric. It is interesting to note that the debate on Portuguese economic backwardness has something in common with the debate on the causes of slower growth in Britain after the 1890s. See McCloskey (1981).

Another possibility would be to compare not only the industrial structure of each country, but a wider range of structural variables related to accumulation, resource allocation and demographic factors, in the lines of what Chenery and Syrquin (1975) have done for a sample of 101 countries for 1950-1970 (see Chenery and Syrquin, 1975, pp. 6-10). Crafts (1985), Prados

Another possible way to approach growth potential is to consider levels and trends in the productivity of the production factors. In that case the best choice would be to study labour productivity, given that it reflects the contribution, not only of labour itself, but also of the other production factors, capital, technology and natural resources.[1] Labour productivity is equivalent to GNP per capita divided by the participation rate of the labour force.[2] For inter-country comparison purposes we may assume similar trends in labour participation rates. Consequently, the levels and growth rates of GNP per capita may be taken as proxies to the levels and trends of labour

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contd.

(1988), and Molinas and Prados (1989) have done similar exercises for the nineteenth century Europe, and their objectives are close to mine here, that is to review the concepts of Spanish "backwardness" or British "climateric". However the Chenery-Syrquin typology draws an important distinction that we cannot depict for the nineteenth century because the sample of countries for which there is data is too small. That distinction is between small and large countries. Chenery and Syrquin (1975) have found that, within a given level of GNP per capita, large countries are less dependent on foreign trade, their exports are less specialized, their pace of structural transformation is quicker, and thus they tend to industrialize earlier. Large countries also tend to have higher levels of investment, a larger industrial labour force and "marginally higher" levels of education (Chenery and Syrquin, 1975, pp. 67-78). Thus it could be misleading to compare the structure of the Portuguese economy with a nineteenth century European *norm* biased towards large countries.

1. See O'Brien and Keyder (1978, p. 84).

2. See, for instance, Kuznets (1973, p. 250). This is so, if a negligible depreciation of capital is assumed, as Tilly (1983, p. 47) points out.

productivity.[1] This is why growth potential for a given country, and the extent of its achievement, may also be inferred from the experience of growth of GNP per capita elsewhere.

Growth potential for backward countries has traditionally been referred to the British experience during the Industrial Revolution, either in an implicit or an explicit form. Yet, it is now well established that British industrialization is not paradigmatic and that its major features - like the rapid shift of the agricultural labour force to industry and services, or the rapid pace of urbanisation - were not repeated elsewhere.[2] For that reason approaches such as those of Rostow's (1966), Landes' (1969) and Gerschenkron's (1962), that view economic growth in the second-comers as a process of response, emulation, or substitution of the main elements of British Industrial Revolution, are not satisfactory.[3] The British level of GNP per capita can be taken as a rough measure for potential productivity growth, because it was the highest achieved in nineteenth century Europe, but it has to be considered independently of the

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1. Participation rates varies with population growth and socio-cultural factors which may vary across countries. However, during the second half of the nineteenth century population increased at quite similar growth rates throughout Western Europe (with the exception of Ireland). Socio-cultural factors are assumed to be neutral. Based on evidence from Maddison (1982) regarding trends in labour participation rates, Baumol (1988, p. 1079) also uses GNP per capita growth as a proxy to labour productivity growth.

2. See, for instance, Cameron (1985), Crafts (1985) and O'Brien (1986).

3. The literature reviewing these growth theories is now immense. For general surveys see Gould (1972, pp. 421-34) and Trebilcock (1981, chap. 1). See also O'Brien (1986).

specific structural features of the British economy. In other words, the degree of fulfilment of economic potential should not be gauged by a comparison to the economic structures of the first industrial nation.

The gap between real and potential Portuguese economic development can be taken as a scalar of the gap between average level of productivity in Portugal and Britain. Thus, our assessment of the rate of success or failure of Portuguese economic growth in the period considered would be measured by the rate at which this gap was narrowed. Given the large size of that gap, however, as Kuznets (1966) remembers:

> "a minimum degree of successful exploitation of the potential (...) cannot be assumed to be as great as the rise in the per worker [or per capita] product of the developed country at the *top* of the array."[1]

The present approach is by no means out of tune with the literature on the history of economic growth. For example, O'Brien and Keyder (1978) follow the same view to take into account the historiographical concept of French "retardation" vis-a-vis Great Britain, although the methodology may differ given that they use direct measures of physical output instead of indirect measures of GNP per capita. In their own words:

> "(...) the gap between British and French per capita incomes provides the least ambiguous and perhaps the only viable statistical basis for introducing or focusing historical discussion related to the retardation of the French economy

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1. Kuznets (1966, p. 481).

between 1780 and 1914."[1]

A measure for potential growth of the Portuguese economy may thus be given by a rate of GNP per capita (as a proxy of labour productivity) that would allow a convergence of the Portuguese level towards Britain or a Western European average level. This measure is less accurate than the alternative one mentioned above, which would involve the comparison of Portugal's industrial structure and productivity levels with that of some country with higher productivity levels. However, the assessment of the growth potential is only an introductory point for the present work, and given the state of present research on Portugal's industrial structure, the choice of this best measurement for growth potential would imply the choice for a full study of the industrial sector. Having said this, it should be present in the reader's mind that the assessment of Portugal's growth potential that follows is speculative.

International economic growth comparisons have recently revealed a pattern of convergence of productivity levels of countries from Western Europe, Northern America and Australasia, from 1870 until our own days, towards the levels first of Britain

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1. O'Brien and Keyder (1978, p. 22). This is also Abramovitz's (1979) approach for analysing post World War II economic growth and growth potential in the OECD area.

and then of the United States of America.[1] The same is to say that, for that set of countries, there is a strong inverse correlation between the ranking level in 1870 and its rate of growth since then.[2] As it is shown below, Portugal did not converge in the period to 1913. The question is then to know whether that was due to failure or to lack of potential.

It is most important to note, however, that the group of converging countries is rather restricted. In fact if countries other than those that have succeeded (the countries of today's OECD), are added to the sample, the convergence pattern is less clear, or disappears altogether, a point of crucial importance to which I return below.[3] Furthermore, one fundamental assumption of the convergence hypothesis is that economies are working under diminishing returns in output per unit of capital. In other words, convergence would imply that new and more productive forms of production have decreasing rates of return. This is why it is expected that countries with higher output per worker levels tend

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1. Britain was surpassed by the US in the early 1890s; the other European countries only reached British per capita income level between 1960 and 1970. The productivity gap was rather large. See Maddison (1982, pp. 96, 212).

2. See Baumol (1986, p. 1073) and Abramovitz (1986, pp. 390-92).

3. On "divergence" see Barro (1989), Baumol (1988), De Long (1988), and Romer (1986). Barro (1989) found divergence for a sample of about 100 countries. However, he also found out that, "holding constant a set of variables that includes proxies for human capital", convergence holds. For the restricted sample of OECD countries, convergence holds in both cases. (Cf. with note below). For evidence relative to the LDCs experience in the 1913-1980 period, see Hanson (1988a, pp. 332-33). Barro and Sala (1990) give evidence for convergence across the United States (1840-1988). They conclude that in the case of open economies the process of convergence is accelerated.

to have lower rates of increase of output per worker. Convergence also implies that the transfer of new forms of production - stemming either from technical or from organizational innovations - are spread out from first comers to other countries. This is a crucial point for our analysis because it implies that late comers have to offer an "institutional and technical preparedness" to import the higher productive methods of the frontrunners.[1] These conditions may be of different kind, and the importance of two have been stressed. The first is the need for similar product mix between late and early comers: new technological methods in British cotton yarn industry or in German chemical industry may be only successfully exported to countries where similar industries exist. The second condition is the level of the importing country's knowledge.[2]

The importance of this much discussed but impossible to measure element - knowledge - is more evident if differences between country productivity levels are explained by the application of modern technology, as is argued by Hanson

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1. Abramovitz (1979, p. 2) See also Abramovitz (1986, p. 405) and Kuznets (1953, p. 22).

2. On the first condition see Abramovitz (1986, p. 397-98) and Baumol (1986, p. 1080); on the second condition see Abramovitz (1986, p. 390), Baumol (1986, p. 1281) and Romer (1986, p. 1003).

(1988b).[1] Furthermore, if the knowledge factor is considered, the crucial diminishing returns assumption is attenuated or weakened, given that this "basic form of capital" may enjoy increasing returns due to the externalities it may create, which are not present in other forms of physical capital invested by the firms.[2] If we resort to the assumption that, within the geographical and historical context of Europe, a country's level of "institutional and technical preparedness" is intimately related to its level of per capita income, the discussion can continue. If so, it may be assumed that to enter the convergence group it is necessary, though not sufficient, that a country has attained a *minimum level* of GNP per capita in 1870, or some other year.[3] This minimum level may be taken at the level of the poorest European country in 1870 to became a member of the

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1. Hanson (1988b) is a comment on Clark (1987a) who explains the differences in labour productivity between developed and under-developed countries "in terms of local culture and environment". Clark's argument is further developed in an article on agriculture where he concludes that: "(...) the people in the low-productivity areas were different from the people we [from high productivity areas] are familiar with" (Clark, 1987b, p. 431). Hanson replies by arguing that the differences in productivity levels, between developed and less developed countries are explained in terms of capital/labour ratios, his empirical support being a regression of proxies to these two variables (the same as used by Clark) (see specially Hanson, 1988b, pp. 671-72).

2. See the critique of the convergence hypothesis in these terms and with a model by Romer (1986).

3. A "minimum adequacy level" to "tap successfully growth potential" is also identified by Kuznets (1966, pp. 477-84) with a minimum product per worker, within certain limits related to the valuation to factors such as slavery and freedom. On the other hand, Abramovitz (1986, p. 388) hypothesizes that "a country's potential for rapid growth is strong not when it is backward without qualification, but rather when it is technologically backward but socially advanced."

"potential convergence group".

That country would be Finland.[1] The point is the following: if Finland belongs to the group of countries that eventually converged, it may be assumed that other countries, *in Europe*, at the same level of 1870 per capita income had the potential to fare equally well.[2] Ipso facto, those countries which did not actually converge neglected some growth potential which was not exploited for whatever reason. Thus Portugal's GNP per capita in 1870 can be indicative of whether Portugal failed or not to fulfil its growth potential. If Portugal's income was above the Finish, then the Portuguese economy would have lost momentum. Consequently we would have to be looking for reasons for failure, along the lines of the historiographical interpretations of backwardness.

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1. See De Long (1988, p. 1141) and table 1.1 below. For reasons related to the availability of compiled figures for other countries, the following comparisons will be limited to the decades from 1870 to 1913 (although some elements for the 1850-1870 period are given in table 1.1) and to Western Europe. The comparison with countries from this area seems the most evident, given that it is the area with which Portugal has stronger historical and economical ties.

2. Romer (1986, p. 1012) concludes along the same lines for the wider set of successful and unsuccessful countries: "(...) the key observation is that those countries with more extense prior development appear to benefit more from periods of rapid worldwide growth and suffer less during any slowdown. That is, growth rates appear to be increasing not only as a function of calendar time but also as a function of the level of development."
Romer's perspective is different from the one of the present text given that he is concerned with ascertaining the convergence phenomenon at worldwide level, while I am only concerned with the experience within Europe. Romer is most critical on the convergence hypothesis although he agrees that convergence is clear among industrialized countries, and it disappears only when centrally planed and less developed countries are included in the sample. See Romer (1986, p. 1013).

Following what has previously been said, the problem then is to know where Portuguese 1870 GNP per capita ranked among European nations. In modern times, the first attempts to compare levels of income per capita, at purchasing power parity exchange rates for a large set of countries, were made by Clark (1951), Zimmerman (1962) and Maizels (1963). Bairoch's (1976a and 1981) more extensive works have been more often used. Bairoch compared GNP levels in 1960 at purchasing power parity exchange rates, and then extrapolated those levels backwards using estimated rates of output growth for each country. For countries for which no GNP indices were available, as it is the case of Portugal, Bairoch constructed his own indices. His estimates have been improved by other authors who used better output indices for the nineteenth century, and more accurate and complete estimates for purchasing power parity GNP levels.[1] New estimates for output growth in Portugal by Justino (1987) and those discussed in the next chapter, and the new estimates for purchasing power parity GNP levels from Summers and Heston (1988), which include a first direct estimate for Portugal, help us to rank Portugal with accrued precision among other European countries.[2]

In Bairoch's (1981) ranking of GNP per capita, Portuguese

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1. See Maddison (1982), Crafts (1983), Abramovitz (1986), and De Long (1988).

2. In Summers, Kravis and Heston (1980), Portugal was not a "bench-mark country", meaning that purchasing power parity exchange rates were indirectly estimated. If the same process had been used in Summers and Heston (1988), the error for Portugal, that is the difference between the actual and the estimated values would be of 17% in 1980 (see, idem, Data Table).

standing was quite high in 1870, but it had fallen by 1913. According to his figures, Portuguese GNP per capita in 1870 was relatively close to Danish level (79%), the Spanish (82%), the Italian (86%), the Finnish (86%) and above the Swedish (110%) levels. Except for Spain, all these countries subsequently converged towards the European level. In this respect Portugal appears as a country that failed.[1] Another estimate from Crafts (1983), based on indirect indicators for GNP, imply a similar high ranking for Portugal for 1890. By then Portuguese GNP per capita was very close to the Finnish (94.8%), Italian (96.5%), Spanish (96.1%), Swedish (97.1%) and above the Norwegian (115.5%) levels.[2] On the other hand, De Long (1988), who is looking for convergence patterns, groups Portugal in 1870 together with other countries which he concludes to have experienced a limited degree of convergence or no convergence at all: Argentine, Chile, New Zealand, and Spain.[3]

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1. See Bairoch (1976a, pp. 284, 286). These figures have been used by authors such as Berend and Ránky (1982), Reis (1984) and Lains (1991b). Bairoch estimated indexes of GNP growth using as a proxy the evolution of some wage indexes for each country. The problem with these estimates involve not only the method, but the data the author has used. Following Bairoch's method but with better data, Justino (1987) gets higher growth rates for that same period.

2. Crafts (1983, pp. 389-94).

3. See De Long (1988, p. 1141). De Long's data is worked out as in Bairoch (1981) and Maddison (1982), that is by extrapolating backward through national income indexes, per capita income figures for each country from recent times. To take into account modifications in national borders, these authors refer to the post-1945 (and pre-1991) borders, as it is the case for Argentina and Chile referred in the text.

His model to analyse the convergence hypothesis incorporates the predictable measurement error of the variables on the regression for the

But the figures for Portugal presented by Bairoch, Crafts and De Long must be revised. The problem with Bairoch's ranking is that his indirect estimate for Portugal's income growth between 1870 and 1913, which he used for the backward extrapolation, is close to zero. However, the available direct evidence on output growth for that period, to be discussed in the next chapter, points out to growth rates for real GNP per capita of about 0.8% per year. Thus Bairoch's figure for 1870 is overvalued. Crafts' estimates are not compatible with the evidence on Portuguese output growth for the 1910-1950 period. In fact, his 1910 GNP per capita value for Portugal ($550 dollars of 1970) does not fit with the figure for 1950 ($456), taken from the same source used for other countries, because it implies a negative rate of growth between 1910 and 1950.[1] This is not in accordance with the evidence of economic growth for the period 1913-1947 from Valério (1983), or with the evidence for the period from the early 1930s provided by Moura (1974) or by the

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convergence pattern:

$$Y(1979) - Y(1870) = a + b \times Y(1870)$$

The slope of the regression (b) varies with the standard error for per capita income (Y) in 1870. Zero measurement error implies b=-0.566 (positing convergence); a measurement error of 17% implies b=+0.669 (positing divergence). His results depend crucially on the quality of national accounts data. See De Long (1988, p. 1144) and Barro (1989, p. 8).

The convergence pattern within industrialised countries differs according to the period considered. Rank correlation between initial levels of labour productivity and rates of growth varies from -0.32 for the period 1870-1890, to -0.97 for the period 1870-1979. See Abramovitz (1986, p. 391).

1. I am grateful to Leandro Prados for this crucial remark. See Kravis et al. (1978), and Bairoch (1976a and 1981).

United Nations. The bias of Crafts' estimates derives from the kind of proxies used to estimate per capita income, namely, infant mortality rates, the age distribution of the population, coal consumption per person, and the number of letters posted per person. In late-comer countries these indicators may reach certain levels at lower per capita income, because poorer countries may benefit from externalities generated by the earlier industrializers. Coal consumption levels in a non producer country as Portugal may depend not only on national income but also on British export prices; infant mortality rates may be reduced by the improvement of overall health conditions in other countries.

In the case of Bairoch's estimates of income per capita, it has also to be noted that they are not compatible with his own estimates for labour productivity in industry and agriculture. For instance, his level of Portuguese GNP per capita was slightly above the Italian in 1860 (104%), in clear contrast with his estimates for relative labour productivity in agriculture and industry shown in the table below (78% and 80% of the Italian level, respectively). In comparison with France and the United Kingdom the overestimation of Portuguese GNP per capita is even larger. Differences between per capita national income and labour productivity relative levels stem from the fact that the latter were computed by using contemporary evidence on output and labour distribution, whereas GNP levels are the outcome of extrapolations based on indirect estimates for income growth,

which are biased downwards as already mentioned.

Table 1.1
Bairoch's Relative Levels of Development for Portugal
(in percentage of the countries shown)

	France		Italy		Spain		U.K.	
	1860	1913	1860	1913	1860	1913	1860	1913
GNP per capita	76%	50%	104%	74%	89%	84%	48%	31%
Agricultural male labour productivity	34%	21%	80%	54%	67%	41%	23%	15%
Manufacturing output per capita	40%	24%	80%	54%	73%	64%	22%	12%

Note: The figures for agriculture do not coincide with those established in table 2.5 below, because they have been recalculated according to the new quantitative data.
Sources: Bairoch (1981, p. 10); (1982, p. 287) and (1989, p. 329)

Using the latest estimates for 1950 purchasing power parity GNP per capita levels from Summers and Heston (1988) and the new indices of output growth (see chapter 2), Portugal emerges in 1870 as quite the poorest country in Western Europe, at a considerable distance from Sweden, Norway, Finland, Italy and Spain (see table 1.2). After all, Portugal was already a relatively poor country by mid nineteenth century. What is more important for our argument is that Portugal no longer appears as a country with the GNP level (or the potential) necessary to enter the convergence club, i.e. a GNP per capita at the Finnish level.

This conclusion has a speculative character, because of the large uncertainties regarding historical national accounts, and the difficulties of inter-country comparisons of income, derived

from our ignorance of national output, consumption and prices structures. But the fragility of this exercise is common to every attempt to quantify assumptions that run implicitly throughout the historiography. In this particular case, the assumption that is implicit in the historiography of Portuguese decadence is that the international standing of the country was better in some historical periods than in others. Moreover, comparing historical national accounts through backward extrapolation of present per capita incomes, measured in terms of purchasing power parity, is the only way of depicting the historical origin of the actual differences of personal income between nations.

Table 1.2

Economic Growth: selected European Countries (1850-1985)

	GDP per capita in 1980 dollars (purchasing power parity ex.rates)					Growth rates (%, year)			
	1850	1870	1913	1950	1985	1850 -1870	1870 -1913	1913 -1950	1950 -1985
Portugal	(456)	(504)	(652)	977	3622	0.5	0.6	1.1	3.8
	(538)	(517)	(728)	=	=	-0.2	0.8	0.8	=
Belgium	1229	1791	2748	3557	9595	1.9	1.0	0.7	2.9
Denmark	1132	1276	2525	4380	10893	0.6	1.6	1.5	2.6
Finland	na	695	1434	2676	9266	na	1.7	1.7	3.6
Netherl.	(1056)	(1451)	2323	3354	9098	1.6	0.8	1.0	2.9
	(1463)	(1649)	=	=	=	0.6	1.1	=	=
Norway	na	1059	1845	3980	12575	na	1.3	2.1	3.3
Sweden	716	946	1794	4014	9780	1.4	1.5	2.2	2.6
Switzer.	na	(1859)	(3105)	4893	10670	na	1.2	1.2	2.3
France	1005	1156	2192	3167	9947	0.7	1.5	1.0	3.3
Italy	na	1014	1429	1850	7445	na	0.8	0.7	4.1
Spain	na	(850)	(1420)	1647	6385	na	1.2	0.4	3.9
		(995)	(1526)	=	=	1.0	0.2		=
Germany	814	1033	2045	2647	10600	1.2	1.6	0.7	4.0
G.B.	1464	2051	3015	4032*	8682*	1.7	0.9	0.9	2.2

(*) U.K.

Notes and sources:

Growth rates for 1950-1985 do not differ substantially (roughly, more or less 0.5 percentage point for annual rates) according to the available alternative sources. A difference of 0.5 point, nevertheless, accumulates over 35 years to a difference of 20%. To bias the above comparisons against the argument presented in the text, the rates for the 1850-1913 period were chosen in order to increase Portugal's position in 1950, so that its position in 1870 was also increased. Figures between brackets are less reliable. For three countries (Portugal, Spain, and Netherlands) it was possible to present lower and higher bound estimates.

GDP per capita for 1950 and 1985 is from Summers and Heston (1988). For previous years the sources are Maddison (1982, pp. 44, 170-73, 180-83), and for Spain: Prados (1988); Sweden: Krantz (1988, pp. 173, 178); Netherlands: Brinkman, et al. (1988, pp. 259-60, col. 4) and Van Stuijvenberg and De Vrijer (1980), quoted in the previous article; and Portugal: Valério (1983), Justino (1987) and Lains (1990).

Even if the comparisons of levels and growth rates of per capita income involve a large degree of uncertainty, they still can tell us if the actual lag of Portugal's GNP per capita was formed after 1950, after 1913, after 1870 or before. Looking at the figures presented in table 1.2, and assuming that the data for growth rates for 1950-1985 and for income comparisons for 1985 are not too bad, we can conclude with some degree of confidence that Portugal's actual disadvantageous position was not formed after 1950, because its GNP increased at the pace of Europe after that year. Part of that gap was formed in the period previous to 1950, as can be inferred just by comparing the available growth rates (and not the levels) of GNP per capita. Moreover, we could play around with the data on growth rates and GNP levels in the table and conclude that Portugal's ranking by 1870 would be much different only with very large margin of errors. In fact we have revised here Bairoch's (1981) ranking for Portugal in 1870, but that involved a revision of the annual growth rate for 1870-1913 from about 0% to about 0.6-0.7%. Although it is unlikely, we cannot reject prima facie that a further revision of the same magnitude could be given by further research for any period from 1870. However such a revision would change radically the perception we now have of the Portuguese economic growth from 1870. Table 1.2 is thus a fair summary of our present knowledge of Portugal's modern growth.

Apart from other sources of error, the range of values for Portuguese GNP per capita in 1913 and 1870 is purposely biased

upwards perhaps by as much as 20%, because they were computed by backward extrapolation from the 1950 figures which overstate for that year and result from taking the lowest estimate for the rate of income growth for the 1950-1985 period. Yet, the difference between Portuguese and Finnish GNP per capita in 1870 is not sufficiently wide to conclude firmly that the potential for growth differed between these two countries.[1] However, the Portuguese rate of economic growth between 1850 and 1870 seems to have been lower than the Finnish, and so the difference in the levels of income could have been narrower in 1850.[2] Thus, even if Portugal does not appear as a country that had the necessary (though not the sufficient) conditions to belong to a convergence group in 1870, it might be because conditions looked different from the vantage point of 1850. But even if this new picture of comparative levels of GNP per capita in Portugal and in the poorest converging country in Western Europe is confirmed by new and better evidence, Portugal's lack of potential might still hold. Finland stood in a singularly low position in the ranking

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1. It should be noted that the Finnish rate of GNP per capita growth between 1870 and 1913 is quite high compared to the ones of the other countries. It is worth noting too that the previous estimate for Sweden gave a even higher rate, but it was recently revised downwards by Krantz (1988), from 2.1% to 1.5% per year, in the same period. These figures led Krantz to revise Sandberg's (1979) view of Sweden as an "impoverished sophisticate", that is a country with high literacy levels despite its alleged low income per capita, as it was given by Bairoch's figures. See Krantz (1988, p. 178n).

2. Portugal's GNP per capita either decreased or increased slightly in this period (see table 1.1). For Finland the available estimates from 1860 point to quite a high growth in the 1860-1870: 1.9% per year (Maddison, 1982, pp. 170, 172, 180 and 182).

of income levels in Western Europe. Thus Finnish convergence may be considered to be special. Convergence was in easier reach for wealthier countries, but that did not exclude special cases like Finland or, for that matter, Japan. The problem remains why some countries managed to overcame their disadvantages, as exhibited by low levels of GNP per capita, while others, like Portugal, did not? - And the fact is that the effort that a country like Portugal would have to make to follow the pace of European economic growth was well above that of most other Western European countries.

To sum up, Portugal had a very low level of GNP per capita which would not allow us to predict that it could have grown at a faster rate than other countries. Portugal was simply not in position to take up new industries and technologies at the rate postulated for other follower countries in Europe.[1] If Portugal had overcome its disadvantages, that would appear in the light of what has been argued here as an extraordinary feature. Whether that effort could be expected from Portugal is a much debatable point, and would lead us back to the discussion that introduced

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1. The view according to which Portuguese economic growth potential was low has been formally expressed first by Reis (1984), who hypothesizes that the major obstacles to attain higher levels of development were of the "structural" kind. Among these, he includes unfavourable natural resources endowments, the small size of the domestic market, or the adverse configuration of the demand in external markets. However, in opposition to our findings, Reis (1984), led by Bairoch's figures, departs from the assumption that by mid-century Portugal's relative level of income per capita was high. Accordingly, nineteenth century Portuguese economic growth would not be much below the growth potential, but that growth potential would have been close to zero.

this chapter: to know whether history allows us to expect the Portuguese economic could have had a higher performance, in relation to its own potential, which other European countries apparently did not show.[1] Any interpretations of the descriptive elements of Portuguese economic growth set up in the next chapter should take into account the actual possibilities of the more optimistic counterfactual stories.

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1. An argument on the opposite direction could also be explored, on the lines of Olson (1983), if the long period of Portugal's continuity as a political unit is considered as a factor favourable to the survival "institutions that control entry and innovation" (idem, p. 31).

CHAPTER 2

ECONOMIC GROWTH IN PORTUGAL, 1851-1913

2.1 - Introduction

The debate on nineteenth century Portuguese economic growth has focussed with particular attention on the period we are analysing here, from the *Regeneração* government in 1851 up to the eve of the first World War. Although there was a handful of minor political and social disturbances, the fact is that these six decades represent, as elsewhere in most of Europe, a relatively calm period. Some authors would prefer to put a break in stability in 1890-91, when Portugal suffered severe problems in its finances and balance of payments, but it will be shown below that there was no such break in economic growth trends. Other

authors would argue that the calm political system established in 1851 was lost by 1865, when the "system started being seriously criticized and the subject of decadence was revived."[1] Yet, these political disturbances did not show up in the analysis of the economic trends, although for this period the quantitative evidence is more scanty given that most series have blanks before 1865.

Stability renders easier the study of economic growth - if not economic growth in itself. Probably correlated to this peaceful environment, the second half of the nineteenth century is also a period for which there is a considerable amount of quantitative evidence as compared to that available for earlier times. In spite of that, the study of Portuguese economic growth has been up to recent years mostly based on qualitative sources and unsystematic analysis of sparse quantitative evidence. For this reason there is disagreement as to the achievements of the Portuguese economy during the period, not only on the question of knowing if there was growth at all, but also on what were the sectors that led or lagged this process, and on the periodization of growth or stagnation. The relatively thin literature on quantitative economic history implied the construction of new series for agricultural and industrial output, which are presented in appendix A.

Recent empirical research on agricultural and industrial

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1. Valente (1982, p. 25).

output, namely the works of Reis (1986a) and Justino (1988-1989), has redirected the debate towards the discussion of the available quantitative evidence.[1] This new basis for debate enables us to set the discussion of Portuguese economic growth in an international context, and it is now possible to study Portugal as a case of more general studies of economic growth and industrialization. This is important if we have in mind that inter-country comparisons of economic growth are one of the few tools we have at our disposal to take into account the growth potential of the economy.[2]

Hypotheses aimed at better understanding Portugal's persistent degree of backwardness throughout the period will be discussed. However, there is no attempt to isolate here specific causes for Portuguese economic backwardness. One of the best ways to *explain* economic growth in a country with so backward a historiography as Portugal is by describing it. According to the new quantitative evidence, Portugal appears as a country where economic growth was not absent during the 1850-1913 period, but where fundamental structural changes did not take place or were only partial. This pace of growth, however, was not sufficient to

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1. The data basis for output on certain sectors and in particular on regional economies has been growing recently thanks to the works of Reis (1979), Feijó (1983), Mendes (1984), Silveira (1988), Martins (1990 and 1991) and Fonseca (1992). I am grateful to Hélder Fonsenca for permission to use his unpublished work. Data for national output from 1900 to 1930 are also published in Marques (1991, chapts. 3 and 4). For a bibliographical survey of official statistics and reports see Marques (1981, chapt. 9).

2. See chapter 1.

close the gap between the level of productivity of the country and that of her neighbouring Western European countries.

International comparisons will show that one particular feature of the Portuguese economy was its *low* degree of openness to international trade. At the end of this chapter this problem is raised, but the fact that the analysis of the foreign sector has been chosen to continue in the following two chapters does not mean that the low share of trade in Portuguese national output is seen here as a particular hindrance for the economy. Moreover, the study of the foreign sector will show that the problem of Portuguese economic backwardness cannot be imputed to this factor alone.

The purpose of this chapter is twofold: to present the historiographical discussion on Portuguese economic history for the period from 1851 to 1913; and to discuss the new quantitative evidence regarding economic growth trends. I start in section 2.2 by presenting a broad overview of contemporary historiography on Portuguese economic backwardness, including recent writings to which this chapter is largely indebted. Section 2.3 presents and discusses the indexes for agricultural and industrial output growth; and the concluding section (section 2.4) will analyse Portugal's level of international integration.

2.2 - Historiography

One important common feature across the works of the authors to be discussed here, is that they aim above all at explaining Portuguese economic backwardness. What distinguishes these authors is how they see backwardness as more or less avoidable. Two opposite poles may be represented by Pereira (1979, 1983), who attributes backwardness to errors of political choice and thus implicitly assumes that it could have been overcome, and Reis (1984), who argues that there was not much room for alternative policies and that economic growth was close to its potential. In between we find authors such as Cabral (1979, 1981), Castro (1978) and Serrão (1978), who identified periods of rapid industrialization, and attempted to explain why industrialization reached its limits before the productivity gap that separated Portugal from most European countries was bridged. Our purpose now is to look into these different views with some detail.

As far as Portuguese agriculture is concerned, the current debate on the 1850-1900 period is still largely indebted to Pereira (1983).[1] This book essentially brings to our times the impressions expressed by contemporary authors. Halpern Pereira held that Portuguese agriculture benefited for a certain time

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1. This book was first published in 1971.

from a "dependent" relationship vis-a-vis Great-Britain (Portugal's major trading partner). That connection helped to develop a "capitalist" agricultural export sector. Agricultural growth, according to the same author, reached a limit by mid-1880s when international markets for Portugal contracted in favour of the new agricultural exporters from "other continents". However, agriculture still had a more "dynamic" evolution than industry. Thus, despite the fact that the industrial sector also registered some progress, the economy at large suffered a process of "de-industrialization" over the second half of the nineteenth century.[1]

But a reorientation of agricultural production towards the national market after the mid-1880s did not occur, according to Pereira, because of a sluggish growth of internal demand, caused by a slow growing industrial sector. The stagnation of industry is seen as the consequence of free trade policies formed in the period between the major tariff revisions in 1852 and 1892. Low tariff rates would have implied that a large share of the Portuguese market was taken by industrial imports from Britain. Agricultural specialisation for external markets and free trade tariffs are perceived as the roots of Portuguese economic backwardness. As the Portuguese tariff policy, according to Pereira (1983), was determined by British willingness to open Portugal's markets for its manufactured exports, backwardness is

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1. See Pereira (1983, pp. 315-17) and (1979, pp. 63-64).

closely tied to "dependence" on Albion.[1]

Halpern Pereira's perspective is now under revision through closer examination of the evidence relative to factors like the share of foreign trade in national output, levels and patterns of tariffs, the behaviour of external markets, and through the comparison of new output indices for agriculture and industry. To start with, as we shall see in detail in the next section, agricultural output growth lagged behind growth in industry by roughly one percentage point per annum (1.5% against 2.5%). Moreover, the importance of foreign markets for Portuguese agriculture does not appear as paramount and it peaked at a level somewhere between 13% and 19% of total agricultural output by 1900. In a large country such as France, for instance, that share peaked at 15% during the third quarter of the century.[2]

In opposition to what is assumed by Pereira (1983), among

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1. See also Serrão (1978, pp. 28-29). This approach has been recently revived by Miranda (1991). For a short summary of Pereira's thesis in English see Pereira (1986, pp. 293-335). It is interesting to note that Pereira (1983) closely follows earlier authors such as Pery (1979, p. 97), who also concludes that agriculture was more dynamic than industry, based on the analysis of export trends, but who however point out that industry had "always" been under tariff protection. Yet, the impression that Portugal was a free-trading country in these decades is widespread among contemporary writers. See for instance, Martins (1979, p. 330), Cordeiro (1896, pp. 42-43) and Teles (1901, p. 66).

2. In Lains (1986, p. 382) I give an export share for Portuguese agriculture of 13%, computed directly from estimates of production and exports (1903/12). However, if we take into account an export share for the total economy of 13.6% (see section 2.4) the agricultural ratio (Xa/Ya) would be somehow higher (19.4%), given that (X are exports, Y output and the subscript a is for agriculture):

$Xa/Ya = Xa/X \times X/Y \times Y/Ya$,

$Xa/X = 0.716$, $X/Y = 13.6$ and Ya/Y is assumed to be 0.5 (see appendix A). For the case of France see Toutain (1977, p. 56).

other authors, trends in agricultural exports cannot be used as proxies for trends in agricultural output.[1] In several instances, like cattle exports, we may note that decreasing exports were not accompanied by a decrease in output. As Pereira (1983) has pointed out, cattle exports dropped significantly from the early 1880s. However, this was compensated by an increase in domestic consumption to such an extent that the sector surpassed the export crisis, and there was even a slight increase in animal output.[2]

The relatively small size of the export sector of Portuguese agriculture casts some doubt on any inferences on the conditions of the sector drawn from trends in exports. Besides this problem, we still have to take into account that the drop in exports by mid-1880s - which assumes such a large importance in Pereira's interpretation of Portuguese backwardness - was to a large extent due to a loss of competitiveness rather than to increasing competition from "other continents", as she argues.[3] Despite being closer to Britain, the world major foodstuffs importer, Portuguese sales of wines, cattle, or fruits increased at a slower pace than international demand for these products. Portugal lost market shares not only to Argentinian meat, but

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1. Sideri (1970) also makes an extensive use of foreign trade statistics in his analysis of Portuguese "dependent" economy. Schwartzman (1989, chap. 3) follows closely this kind of approach to economic history.

2. See Lains (1986).

3. Pereira (1983, pp. 319-20). See also Miranda (1991, p. 8).

also to Spanish and Italian Mediterranean products.[1]

The last contention of Pereira's (1983) general explanation for Portuguese backwardness regards tariff policy. Here again facts do not bear out theories. In disagreement with her opinion, free trade was not an hindrance to industrial growth, simply because since 1837 Portugal never ceased to have high duties on industrial imports.[2] As elsewhere in Europe, the political debate over tariff policy took up a large part of the preoccupations of contemporary writers, and frequently those in charge in government were theoretically free-trade supporters. Yet, the economic history of tariff protection has to be based on the analysis of duties actually paid to the customs in terms of import prices, and not on the analysis of changes in nominal tariffs. This is a point that does not show up often in the economic history literature. When actual duties are analysed, the conclusions about changes in the level of nominal protection

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1. See Lains (1986).

2. Pereira (1985, p. 523), in debate with Tortella (1985b), argues that protectionism would require a complete different set of historical events in Portugal. Yet the fact that Portugal was protectionist is still compatible with some of the pioneer views of Pereira's work. It is also interesting to note that in a later work, Pereira (1991, p. 109) refers to Portuguese trade regime as one of a "mild" free-trade. Contemporaries, and in particular the concerned British diplomatic clerks, were of course well aware of the protective character of the Portuguese tariffs. See the detailed analyses in *Parliamentary Papers* (1867-68) and (1878).

become rather different.[1]

Due to the importance tariffs had for government revenue in Portugal, duties were never reduced below the *ad valorem* level of about 25%.[2] Changes in the specific rates (that is, rates imposed on the volumes of imported goods) were offset by changes in import prices.[3] And in fact, import prices fluctuations affected more the average level of protection than actual changes in specific tariff rates. Table 2.1 shows the evolution of tariff levels corrected for changes in the composition of imports for a sample of years chosen according to major changes in duties. We may see that tariffs increased successively after 1856, and decreased slightly only after 1897. Moreover, specific tariff rates changes affected all imports, from raw materials to finished products, so *effective rates of protection* were not much

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1. See Milward (1981, p. 58) and the most complete empirical evidence in Capie (1983). When actual duties are analysed, the conclusions became rather different. A good related example is provided by comparing the two works of Nye (1989) and (1991). In the first, where actual tariff levels are not measured, the author assumes the conventional wisdom over the Anglo-French treaty of 1860. In the second article he reaches an outstanding re-assessment of British and French tariff regimes simply by plotting actual tariff rates of the two countries. See also for Spain, Prados (1982, p. 28n), and Costas (1988, p. 100), who shows that Figuerola's supposedly free-trade tariff reform of 1869, was nothing of the kind. I have also carried on this kind of analysis in Lains (1987).

2. See Reis (1984; 1986b), Mata (1985, pp. 90-91), Justino (1988-89) and Lains (1987). Previous to these authors, Cabral (1981, pp. 105 and 164) had already the intuition that free trade was never installed, but a "gradual protectionism *à outrance*" of the "highly protectionist" 1837 tariff. Regarding the political debate on tariffs see Ribeiro (1977). For the analysis of tariff policy prior to 1852, see Bonifácio (1986, 1987, 1989b).

3. See for the American tariff Hawke (1975, p. 98).

affected (table 2.2).[1] In conclusion, Portugal was never a free-trade country. Consequently, it is certainly exaggerated to argue that "the protectionist tariff of 1892 marked, after 189 years, the true end of the Methuen treaty between Portugal and England [from 1703]."[2]

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1. For the evolution of effective rates of protection for cotton goods see Lains (1987). There are some instances of negative effective rates of protection, as Martins (1954, p. 114), writing in 1882, had already the perception.

2. Bairoch (1989b, p. 79). This author draws his analysis of Portugal's trade regime basically from Pereira (1983).

Table 2.1
Average *Ad Valorem* Tariffs (%)(*)

	1843	1851	1856	1865	1873	1886	1890	1897	1905	1913
Total imports										
Current value	24.1	29.4	20.3	30.4	27.2	35.4	33.2	31.9	28.6	22.1
Fixed weights										
1865 base	25.8	30.4	24.9	30.4	32.6	52.4	43.1	43.9	40.8	34.0
1913 base	15.8	19.7	13.4	18.5	17.2	27.0	30.3	27.8	26.9	22.1
Excluding cereals, tobacco and sugar										
Current value	21.6	25.4	18.8	19.9	17.8	20.7	25.7	25.2	21.6	17.2
Fixed weights										
1865 base	19.9	24.0	18.6	19.9	19.6	25.1	31.2	33.4	30.2	25.9
1913 base	14.1	17.8	11.9	15.6	13.5	16.6	22.9	22.4	20.1	17.2

(*) Total duties/total imports.
Source: Lains (1987, p. 485)

Table 2.2
Ad Valorem Tariffs for Main Imports (%)

	1843	1851	1856	1865	1873	1886	1890	1897	1905	1913
Foodstuffs	28.6	45.0	23.7	28.3	33.4	45.1	48.8	45.8	47.2	40.2
Cereals	*8.4*	*11.1*	*2.4*	*9.1*	*5.6*	*28.3*	*43.3*	*26.1*	*38.1*	*27.8*
Raw materials	3.8	3.9	1.1	0.8	0.6	3.1	4.2	5.2	5.3	4.1
Raw cotton	*5.6*	*3.2*	*0.2*	*0.1*	*0.1*	*0.0*	*0.0*	*1.9*	*1.7*	*1.2*
Coal	*4.4*	*5.3*	*1.3*	*0.0*	*0.0*	*8.3*	*9.4*	*11.2*	*8.5*	*7.7*
Intermediates	14.0	16.1	8.7	10.4	8.2	8.4	13.4	15.0	12.5	7.7
Cotton yarn	*20.8*	*32.5*	*21.5*	*19.2*	*24.3*	*32.6*	*38.2*	*52.5*	*50.5*	*32.8*
Chemicals	*17.8*	*17.1*	*9.4*	*10.3*	*11.5*	*13.9*	*21.2*	*16.0*	*10.6*	*10.1*
Metals	*11.9*	*16.3*	*4.7*	*6.8*	*4.1*	*2.5*	*3.8*	*4.7*	*4.2*	*3.3*
Manufactures	28.2	30.8	27.5	22.7	25.5	29.6	29.6	42.1	20.7	25.9
Cottons	*25.1*	*28.5*	*28.2*	*17.3*	*23.3*	*36.5*	*40.0*	*44.5*	*40.0*	*34.7*
Woollens	*38.0*	*40.3*	*33.7*	*37.5*	*38.5*	*44.7*	*49.2*	*79.4*	*69.8*	*60.2*
Machinery	*2.0*	*0.8*	*0.7*	*1.4*	*0.9*	*1.1*	*8.6*	*11.0*	*11.5*	*10.6*
Metals	*26.4*	*31.1*	*9.8*	*22.9*	*21.6*	*25.5*	*34.2*	*36.4*	*32.5*	*28.4*

Source: Lains (1987, p. 490).

In clear contrast to Pereira (1983), other authors have presented a favourable picture for Portuguese industrial output growth. Their analysis is based on scattered observations for imports of industrial raw materials and machinery and on evidence for the growth of horsepower capacity in industry. Castro (1978) and Cabral (1979) argue that there were two important leaps in industrial output in the mid-1870s and early 1890s. For the latter period, Cabral (1979) proposes quite high growth rates for industrial output, in close agreement with an earlier author, Vieira (1905), who hypothesised a rate of industrial growth from 1891 to 1904 of about 9% per year.[1] Whereas Pereira (1983) had focused on the importance of external markets that hindered, according to her, sustained agricultural expansion and thus industrial development, Cabral and others pay more attention to the possibility of industrial import-substitution opened by changes in economic policy derived from financial difficulties and problems in the balance of payments. Such industrial upsurge could be the result of the new 1892 tariff, which increased specific duties on industrial imports into Portugal. In the same year a colonial tariff protected the African markets for Portuguese cottons and wines by imposing higher differential duties for foreign goods and shipping. However, as already noted,

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1. See Castro (1978, p. 36), Serrão (1978, p. 23) and Vieira (1905, pp. 477-78). Regarding the effects of the 1892 tariff see, among other historians, Castro (1978, p. 145), Cabral (1979, pp. 85 and following). For a short review of this literature see Reis (1986b, pp. 68-69). Pedreira (1988) gives an interesting review of "old" models for industrial fluctuations for Portugal from 1670-1890.

the new 1892 tariff did not imply significant changes in the rate of industrial protection in Portugal.[1] And the increasing protection of the colonial markets that in fact occurred was not particular significant, given the weight of the colonial trade in the economy.[2]

Serrão (1978), who also follows closely Pereira (1983) in her description of trends in agriculture, argues that an industrial spurt occurred around 1885-1890. Industry would have benefited from the investment of resources diverted from the contracting agricultural export sector. In agreement with Cabral (1979 and 1981), he argues that there was an import-substitution industrial spurt dependent on the domestic and colonial markets. Neither Serrão nor Cabral give a precise idea of which industries would have led the industrial "spurts" they talk about. The quantitative evidence they provide is based on foreign trade statistics, in particular imports of machinery and raw materials. Because only raw cotton is imported for a specific sector, the only industry that is specifically mentioned is cotton

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1. Cabral (1974, p. 72) and (1981, pp. 226 and 275), following authors such as Vieira (1905, p. 466), argues that the 1892 tariff did not have as many effects on industrial output as currency depreciation that followed the "curso forçado". He also argues that free trade did not apply to the industrial sector - contrarily to agriculture, that is to corn - because of bilateral trade agreements. This is not fully correct because the few treaties that were signed implied the concession of the most favoured nation clause leading to tariff reductions. For an analysis of trade regime see Lains (1987) and Justino (1988).

2. Castro (1979, p. 175) points to a share of exports to the colonies in Portuguese GNP in 1910-15 of 2%.

manufactures.[1] But these two authors clearly do not agree on the timing, and consequently on the importance of the changes brought by the 1890-1891 crisis. Serrão (1978) prefers to see the cause of such industrial spurt in a so-called "voluntarism" of the state, which was compelled to protect industry because of a certain commercial recession. Serrão follows the model of Godinho, according to which, in Portuguese history, industrialization "always" followed commercial depressions.[2]

The historians mentioned up to now agree on the existence of some kind of trade-off between industrial and agricultural output growth, specially in the aftermath of the 1892 tariff. According to them, this trade-off was the result of two sets of factors: (1) an intimate and positive relationship between agricultural exports and agricultural output, on the one hand, and, on the other, a negative relationship between imports of manufactures and industrial production; and (2) constraints related to the balance of payments. Accordingly, higher agricultural output growth would be associated with higher growth of agricultural exports, which would provide foreign currency to pay for industrial imports and, as a consequence, industrial growth would be reduced. Inversely, a slacker agricultural sector would imply lower foreign currency earnings and a shift towards import

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1. Cabral (1981, pp. 282-92) characterizes the main industrial branches reported in the industrial census of 1881. For the 1890s see Cabral (1979, pp. 87-91).

2. Serrão (1978, p. 27) and Godinho (1975, p. 118). See Reis (1986b, pp. 68-69) for comments on these authors.

substitution.[1]

Reis' (1986b) analysis of industrial growth, based on his new index of industrial output, sheds new light on this discussion. He concludes that industrial output should have increased more rapidly than agriculture (given plausible growth rates for aggregate output) and at a relatively smooth trend. The relation between cycles in exports and industrial growth hypothesised by the authors we have previously discussed did not show up. Furthermore, as one would have expected from the conclusions on changes of protection levels, the 1892 tariff did not affect significantly the path of industrial growth. Industrial cycles, according to Reis, were affected by international cycles through short-term capital movements.[2]

Reis has redirected our attention to domestic constraints on Portuguese economic growth, both on the demand and supply sides. According to him, industrial growth was hindered not by lack of protection, but by the small size of the Portuguese domestic market. For him growth potential and not economic policy is at the root of the low pace of Portuguese industrial development. As a matter of fact, the size of Portuguese market for some

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1. See the summary of these works in Reis (1986b, p. 209). As stated there, the industrial spurt mentioned by Cabral (1981, pp. 280 and 293) during 1873-1886 would have been an exception to the mentioned trade-off, given that it would have been based in the enlargement of the internal market due to export revenues. It is worth noting how this interpretation contrasts with Pereira's (1983).

2. See Reis (1987, pp. 215-16).

industrial sectors was definitively too small to reap economies of scale not only at the industry level but also at the firm level. For instance, total iron consumption in Portugal by 1900 was equivalent to total output from an average European factory; while Ransomes (an English producer of agricultural machinery) had an output equivalent to total Portuguese imports of machines by the same date. Some industrial sectors that in other countries increased considerably, generating important benefits, were virtually unexplored in Portugal.[1]

In spite of the attention given to domestic demand, Jaime Reis (1986b) stresses above all supply constraints. He starts by pointing out the unfavourable natural resource basis for Portuguese industry - lack of coal and iron - which meant weak intersectoral relations within the sector. But the major bottleneck had its origins in the competitive disadvantages of Portuguese industry, which hindered its capacity to export. In fact, as he notes, the advantage provided by lower wages in Portugal compared with its trade partners, was offset by estimated low value added per industrial worker. Thus he concludes that the basic problem of Portuguese industrial development could have been a lack of general education -

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1. For the discussion of the importance of the size of the market for economies of scale see Fabricant (1960), Denison (1967, p. 225-35) and Mokyr (1977). Its noteworthy that Mokyr's argument, according to which there are no small markets because the number of firms can be reduced until the optimal scale is reached, does not hold in these examples given for Portugal where not even one firm can be installed. Small markets may also hinder gains from externalities.

essential for improving labour productivity levels, and thus competitiveness.

According to Reis (1989), the lack of instruction of Portuguese industrial workers was just an expression of the overall large degree of illiteracy of the whole population.[1] Illiteracy rates in Portugal were considerably higher than in other Western European countries, including the Mediterranean countries. The reasons adduced for this lag are not related to a low investment capacity from the State, the only entity that could provide for more education, given that private demand for education was low. In fact, to attain the level of Spain and Italy by 1913 it would imply an increase of 1 to 2% of annual public expenditure.[2] In conclusion, the low investment of the Portuguese State in education, and the associated high illiteracy rates, is not explained by economic factors but instead by political factors. In other words, the State in Portugal never felt the need to promote education as a means to achieve "national" integration, in contrast to what happened in most European countries that in some point in history were laggers,

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1. For a contrasting perspective see Mónica (1987, p. 854-55), who argues, following (Sérgio, 1924), that the educative bottleneck resided only at the level of specialised industrial workers. See also Reis (1989, p. 96n). Saraiva (1972, p. 27), in agreement with Reis (1989), argues that the general level of literacy mattered the most, and not whether there was or not a leading *élite*. However he recognises, as Mónica (1987) does, that Portugal's low level of literacy was related to the country's level of development: a population badly feed, badly paid, and badly equipped in technology "cannot have high cultural standards".

2. Reis (1989, p. 108).

namely Germany, Italy and Spain.[1]

Given the low magnitude of the needed public investment effort on education, one important inference we can draw from the analysis above is that a small additional financial effort from the Portuguese State would have promoted general education, as well as industrial education, and thus would lead to increasing labour productivity. Higher levels of labour productivity would in consequence lead to increasing capacity to export industrial goods and thus to an increasing rate of structural change.

However, Reis (1984) argues that the overall potential of growth of the economy was limited. After showing through counterfactual analysis the low impact on economic growth of the alternative paths proposed by the Portuguese historiography, namely import substitution of industrial goods or export promotion of manufactures, Reis (1984) goes on exploring the consequences of one "plausible" alternative path of growth, which would have been a higher specialization in agricultural exports. At this stage his analysis concentrates on the counterfactual of increasing the exports of what was already Portugal's major export item, wine. He concludes that this higher specialization was feasible in terms of the domestic productive capacity, and

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1. This view on the role of the Portuguese state can be related to Olson's (1983) argument according to which societies with a longer history of stability develop special interest groups that may resist "socially efficient readjustments" and thus develop "institutional sclerosis". Thus, the long period of Portugal's continuity as a political unit may be a factor favourable to the survival "institutions that control entry and innovation" (Olson, 1983, p. 31).

would have brought a 14% increase in the GNP in one year. However, by analysing the position of Portugal in the international wine market, he further concludes that such an alternative would imply an improbable increase of the share of Portuguese wines in the European markets from 10% to 47%, by 1910.[1] Thus, growth potential was limited by Portuguese productive specialization and the conditions in the international markets. It has to be taken into account, though, that this counterfactual involves just one of the agricultural products in which Portugal had, at least at some points in time, some comparative advantage. More importantly, however, as shall be made clear in chapter 3, and as Reis (1984) himself recalls, the increase in market share in terms of volume would be significantly lower if the terms of trade for wine improved. One way in which such an improvement could arise is through increases in the quality of wine, namely a reduction in the alcoholic content, and better commercialisation.[2] As such, if the counterfactual proposed by Reis was not feasible, this would have been due not only to adverse external market conditions, but also to lack of ready capital to increase quality and productivity levels.

The discussion on the importance of domestic factors to the growth of industry is also present in the conclusions in Justino

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1. Reis (1984).

2. See Reis (1984, pp. 23-24).

(1988-1989), an extensive monograph on Portuguese agriculture and industry. Based on the analysis of the Reis' index and on his own indirect estimates for GNP growth, Justino concludes that industrial growth closely followed the growth of national income, except for the periods 1886-1890 and 1905-1910. Consequently, industrial growth would have depended on the growth of internal demand.[1] This conclusion, however, is based on too hasty a comparison of the above mentioned growth rates. A closer look at the evidence adduced shows that it does not hold for the whole period of 1885-1910:

Per capita growth of (% per year)

	GNP	Ind.Out.		GNP	Ind.Out.
1870-1875	2.3	2.5	1890-1895	-1.5	0.8
1875-1880	-1.1	-1.0	1895-1900	1.5	2.8
1880-1885	3.2	3.1	1900-1905	1.4	0.7
1885-1890	0.5	2.5	1905-1910	-0.5	1.8

Source: Justino (1989, pp. 101 and 129)

In any case the conclusion about the relation between industrial growth and GNP growth put forward by Justino is based on estimates for GNP which cannot be used for detecting short or medium-term cycles in Portuguese economic growth, because they are too much dependent on the fluctuations of the proxy variables on which they are based: exports, imports, and government finance and revenue.[2] Despite these problems, to which we shall return

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1. Justino (1989, pp. 128-29). For GNP estimates see also Justino (1987).

2. See Justino (1987).

below, Justino's estimates for GNP growth call our attention to the possibility that the Portuguese economy expanded from 1850 to 1913, in per capita terms, in clear contradistinction to Bairoch (1976a), according to whom there was almost no growth at all during that period.

Recently Justino's GNP estimates have been refined by Nunes et al. (1989), who present a first overall picture of long-term Portuguese economic growth throughout 1833-1985. These authors define for the second half of the nineteenth century two distinctive periods of about 25 years each: from 1860 to 1888, when total real GNP increased rapidly, at 2.8% a year, followed by a period of near stagnation, in 1889-1913, when GNP growth fell to 0.9% a year.[1] This sudden drop in GNP growth is seen as a consequence of financial difficulties of the State, reinforced by problems in the balance of payments, following the crisis during 1889-1891. It is not difficult to agree that the financial and political disturbances during those years had some sort of negative effects on Portuguese economic growth. Nevertheless, suspicion should arise from the depth of the effects deduced from the estimates from Nunes et al. (1989): a contraction of the annual total GDP growth rate from 2.8% to 0.9%, that would have lasted for a whole quarter of a century (1889-1913). To explain such contraction, Nunes et al. (1989) give extreme importance to

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1. For a comment on the reliability of these estimates see Lains and Reis (forthcoming). In terms of periodization, these estimates do not differ significantly from those of Justino's.

the direct effects of the public investment on social overhead capital. As they put it, the year of 1889 marked

> "the end of the structural economic policy directed towards the building of transportation facilities and of the social infrastructures in consequence of the financial problems of the State."[1]

This conclusion implies that the direct effects of public investment prevailed over the indirect effects, otherwise they would be lagged in time. This second hypothesis, in fact, is supported elsewhere by two of the authors, who have argued, based on earlier estimates of GNP growth from Valério (1986), that "the institutional and investment effort of the State" had a "delayed success".[2]

A further explanation for this drastic downturn in Portuguese economic growth in 1889 is, according to the same authors, the stagnation in agricultural growth. This is inferred from the comparison of their estimates of total GNP growth to the industrial output growth given by the Reis' (1986b) index.[3] Nunes et al. (1989) do not quantify the implicit contraction in the agricultural sector but, by simple algebra and not too heroic assumptions, we may conclude that their GNP growth estimates imply a contraction of the agricultural growth rate from 4% in

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1. Nunes et al. (1989, p. 301).

2. See Valério (1986) Mata (1988) and Nunes et al. (1989, p. 300). The view according to which investment in social overhead capital had delayed effects on the rest of the economy as been proposed by Romeo for the case of Italian investment on railroads, as referred by Fenoaltea (1968, pp. 8-9).

3. The periodization here is different from that of Justino above, because Justino takes average yearly growth rates for periods of five years.

the period from 1860 to 1888, to 0.4% in the following period, 1889-1913. This is rather implausible taking into account the evidence from agricultural output statistics, to be analysed below.[1] It is worthwhile recalling that such a conclusion about trends in agricultural output growth is in agreement with what has been argued by Pereira (1983). The convergence between the conclusions of these authors can be explained by the fact that both use indirect estimators for output growth: Pereira (1983) uses export statistics, whereas Nunes et al. (1989) use statistics from foreign trade and government accounts.

As pointed out in Lains and Reis (forthcoming), the use of two sets of proxies related to government and foreign trade is not a major hindrance in what concerns the estimate of *secular growth*, although even here there are unsolved problems.[2] The greatest problem concerns in fact the reliability of the *short-term fluctuations* that were found. A closer look to the two rather steep upswings shown by the index in the years 1867-1875 and 1879-1888, when real total GDP growth rates reached 4.9% and 5.2% per year, respectively, helps detecting where the indices

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1. To estimate the above rate, I assumed that the service sector expanded at the rate of population growth. Estimates for sectoral composition of output are based on population distribution and hypothesised labour productivity gaps between the sectors, for 1890. They are as follows: agriculture, 50%; industry and services, 25% each (see appendix A). The change in agricultural output growth inferred in the text is not too sensitive to these assumptions.

2. Lains and Reis (forthcoming) have tested the reliability of the indices by comparing equivalent indices estimated for other countries, with the available GNP indices for the same countries computed directly.

from Nunes et al. (1989) may have gone wrong. One determinant clue is given by noting the close relationship between the fluctuations of the GNP index and those of the two proxy variables from the government sector, the weight of which add up to more than 4/5. Public expenditure, the variable that fluctuated the most, had two periods of intense growth precisely between 1865 and 1876 (increasing at 4.8% per annum) and between 1876 and 1889 (2.9%). From 1889 onwards its trend growth declined to 1.5% per year. In conclusion, too much importance is given to the financial sector, in particular to public finances. As such it is not surprising that, despite their quantitative approach, the conclusions from Nunes et al. (1989) are in close agreement with the conclusions of the economic historians referred to above, who basically worked on qualitative sources. Financial problems were certainly an important determinant of the path of growth of the Portuguese economy, but probably not as much as historical analysis of contemporary discussion has led us to think. The next section is an attempt to redirect the discussion on Portuguese backwardness, by paying more attention to the real economy.

2.3 - The growth of agricultural and industrial production

The discussion of the many issues raised in the previous presentation of the historiography on Portuguese economic growth (or backwardness) can be clarified by adding quantitative evidence on output trends to the discussion. The statistical basis, drawn mainly from official sources, on which the indices for agriculture and industry were computed is incomplete and doubts must be cast on its reliability. By constructing indices with that data instead of using it sparsely as has been done until know, however, we may check their consistency. As such, it is possible to draw better founded conclusions on the patterns of physical output growth discussed in the previous section.

According to the index for Portuguese agriculture set up in appendix A, the growth of output in the period from 1850 to 1913 registered quite severe fluctuations. This is an important feature of the sector, and it explains to a great extent the high trend growth rate found for the three decades till the peak years at the end of the century. In fact, Portuguese agricultural output increased in real terms at 1.7% per annum from 1870 to 1903, a rate that does not compare badly to those of other European countries in periods when agriculture registered more intensive growth. For instance, the maximum growth rate for British agriculture, between the 1820s and the 1850s, was 1.8% per year; in France, agriculture had its highest rate of growth

around the same period at 1.2% per year; finally, in Germany, agricultural (net) output increased between 1850 and 1913 at 1.2% per year.[1]

As shown in table 2.3 and graph 2.1, there are two moments of absolute decline in the agricultural output index: 1852-1858 and 1900/03-1912. The main cause for the bad years in the 1850s was the *oidium* vine disease, which drastically reduced the output of wine (including all kinds of common and liquor wines) by two thirds.[2] As a consequence, total agricultural output decreased by roughly 25% in less than one decade; and its real value relative to 1852 was only attained once again three decades later. It should be noted that in these years the markets for wines, either domestic or foreign, were not affected by exogenous shocks in demand. The sharp decline in agricultural production observed in the first decade of the twentieth century (1900/03-1912) was due to decreasing wine and cereal output. This second negative trend clearly shows how fragile were the increases in the level of agricultural output still by the eve of World War I.

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1. See further evidence in Eddie (1968, pp. 213-15) and Toutain (1987, p. 57) According to the figures for (male) labour productivity in Hayami and Ruttan (1980, pp. 327-31) the growth of output per worker in Portugal between 1870 and 1903 (see table 3.2 below) also compares favourably. The rates there mentioned are: 0.3% per year in U.K., 0.8% per year in France and 1.7% per year in Denmark. For productivity figures see also Bairoch (1965, p. 1099). See also a comparative table in Simpson (1987, p. 273) and Van Zanden (1991, p. 229).

2. See Justino (1988-89), and further evidence on appendix A.

Table 2.3
Growth of Agricultural Output, 1846-1912
(%; per year)

Period	Cereals	Wines	Ani.Prod.	Total
1846-1852	0.92	3.05	0.16	1.44
1852-1870	0.14	-1.33	0.45	-0.27
1870-1885	-0.40	3.08	1.36	1.40
1885-1903	2.03	1.37	0.98	1.44
1903-1912	-0.49	-1.86	0.19	-0.79
1846-1885	0.05	1.02	0.75	0.63
1885-1912	1.18	0.28	0.71	0.69
1846-1912	0.51	0.72	0.74	0.66

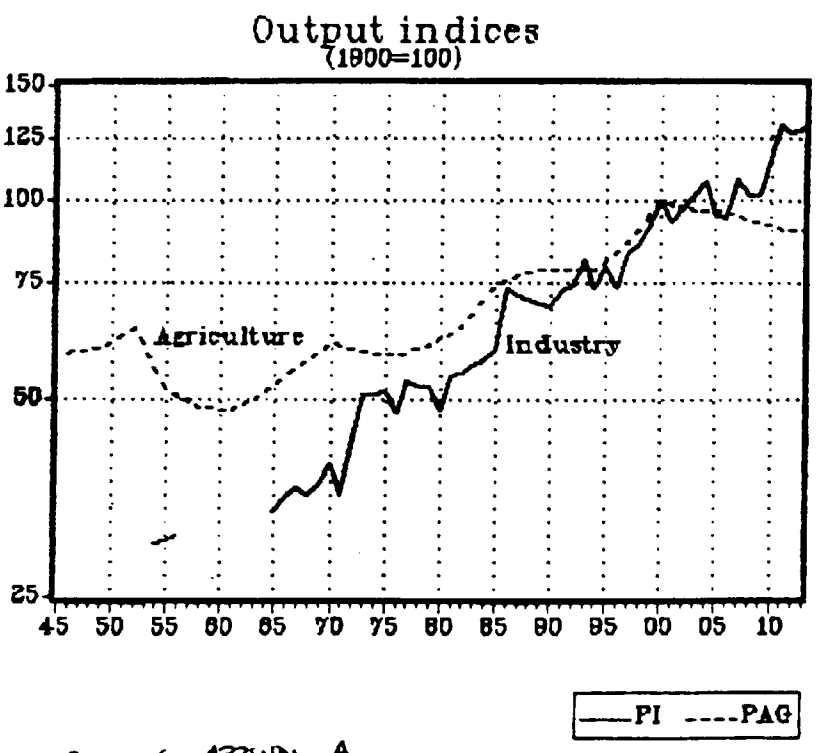
Notes: Periodization chosen according to main fluctuations of the indexes. The years refer to three year averages.
Source: appendix A.

Table 2.4
Sectoral Contributions to Agricultural Output Growth

	Sectoral contributions for growth (C(ti))			
Period (t)	Cereals	Wines	Ani.Prod.	Total
1846/52 - 1867/73	63%	-219%	57%	100%*
1867/73 - 1882/88	- 3%	68%	34%	100%
1882/88 - 1897/1903	24%	58%	19%	100%
1897/1903 - 1906/12	90%	-233%	43%	100%*
1846/52 - 1906/12	23%	44%	33%	100%
1866/73 - 1897/1903	14%	62%	25%	100%

Notes and sources:
* negative growth
Computed from appendix A. Relative weights of each sector (i=1,2,3) from table 2.5, excluding "others".
Sectoral contributions for growth (C(ti)) computed as:
C(ti) = a(i) x [Y(ti)-Y(ti-1)] / [Y(t)-Y(t-1)] x 100 where,
C(ti) = Contribution of the i product for output growth of the sum of the three sectors considered.
Y(t) = Total output index number for period t
Y(ti) = Partial index number for period t
a(i) = Relative share of the i product in the sum of the three products.

GRAPH 2.1



SOURCE: APPENDIX A.

Fluctuations in Portuguese agriculture were to a large extent due to variations in wine production, which accounted for a large share of total output (see table 2.7). In Europe, only Italy was so dependent on a crop exposed to such wide variations in output. While wine accounted for roughly 25% of Portuguese agricultural output (between the 1860s and the 1900s), French wine output reached a proportion of 14% of agricultural output in 1865/74, decreasing to 8% in 1905/14; in Spain the corresponding values decreased from 16% in 1891/95 to 10% in 1910. In Italy wine output accounted for 22.5% of agricultural output in 1911. It is worth noting that the higher concentration of Portuguese agriculture on wine is partially due to the size of the country. There are regions in Spain with a smaller size than Portugal in which wine accounts for larger shares of total agricultural output. As such, the large concentration of agricultural production was to a certain extent determined by natural resource endowments favourable to the vineyards.[1]

If on the one hand the rapid growth of agricultural output from 1870 until 1903 supports Pereira's view of Portuguese

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1. In the absence of readily available statistics on regional output, we may compare the soil distribution in Portugal (in 1902) and in the Spanish regions (in 1910) (wine area under crop, %): Portugal 10.1% (from total area of 3,111,000 ha); Spain 6.8% (18,827,000), of which: *Pais Valenciano* 26.3% (906,000), *Catalonia* 20.3% (1,071,000), *Murcia* 18.8% (310,000), *Aragon* 7.9% (1,236,000), *Estremadura* 1.9% (1,412,000), and *Andalucia* 2.2% (3,644,000). See Table A.12 and Garrabou (1988, pp. 72, 117, 124, 158, 177). For the composition of agricultural output see O'Brien and Keyder (1978, p. 113) for France, G.E.H.R. (1987, p. 412) for Spain, and Federico (1990, table 1) for Italy. I am grateful to Giovanni Federico for his permission to use his unpublished results.

agriculture as a "dynamic" sector, it has on the other hand to be taken into account that agriculture by 1870 had just recovered the output levels of twenty years earlier. Agriculture was growing rapidly because it was recovering. It is thus not surprising that the growth of agricultural output was not accompanied by increases in land productivity for main crops such as wheat and maize (see appendix A). Furthermore, by 1900 Portugal still had one of the most backward agricultural sectors in terms of labour productivity. Table 2.5 presents estimates of labour productivity in agriculture for Portugal and other countries in Europe.[1] The figures on that table show that there is a decline of Portuguese relative labour productivity levels, in comparison to all countries except Spain.

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1. Bairoch (1965 and 1989) and Silveira (1986). The figures given for Portugal by these studies have been revised in order to take in to account the new data (see appendix A).

Table 2.5
Labour Productivity in Agriculture
(Portugal as a % of)

Country	1852*	1870*	1906*
Belgium	58.8%	43.3%	38.8%
Sweden	68.6%	47.3%	44.1%
France	47.4%	36.5%	39.4%
Italy	137.2%	94.5%	102.4%
Spain	56.1%	57.8%	80.0%
Germany	68.6%	41.6%	27.2%
U.K.	32.9%	23.9%	27.8%

Notes and sources:
These estimates have been computed according to Bairoch (1965), using data on appendix A. The results differ from those for Portugal given by Silveira (1986) and Bairoch (1989, p. 329). (Cf. with chapter 1).
(*) Compared to the averages of 1840/60, 1860/80 and 1900/10, respectively, from Bairoch (1965, p. 1096).

Estimates for the contribution of the production factors land, labour and capital to agricultural growth in the three decades up to 1900 provide further support for the conclusion on the extensive character of output growth in that period. Such estimates can only be approximate, because the necessary statistical information is obviously far from satisfactory, in particular regarding the capital formation in agriculture. Nevertheless, it is possible to get some concrete results on the basis of lower and higher bound estimates.[1]

1. For a discussion of these estimates see appendix A.

Table 2.6
Sources of Growth in Agriculture, 1867-1902
(%; per year)

			Labour		Land		Capital		Prod.
	δY/Y	=	δL/L x α	+	δT/T x β	+	δK/K x μ	+	Z
A	1.57%	=	.45% x .60	+	.69% x .30	+	.65% x .10	+	1.03%
B			x .50		x .35		x .15		1.01%
C			x .40		x .40		x .20		.98%
A	100%	=	17%	+	13%	+	4%	+	66%
B			14%		16%		6%		64%
C			12%		18%		8%		62%

Notes and sources:
Y = Gross agricultural income; L = Agricultural male labour force; T = Agricultural land; K = Agricultural capital.
The above ratios are annual growth rates in % (δ stands for variation between 1867 and 1903). α, β, μ are, respectively, shares for labour, land and capital incomes in agriculture. Z is total factor productivity growth.

Income shares are from: Lines A and B: Mateus (1986, pp. 22, 36); Line C: Crafts (1985, p. 84), corresponding to Britain in 1760-1831. For the constancy of these shares over time and across countries see Vanek (1969, p. 149). See also Van Zaden (1991, p. 219n). Results are not much sensible to plausible differences in these values.

For capital stock growth, I assumed as a proxy the growth of the stock of working animals. A more optimistic growth rate for K is given by the hypothesis of a constant capital-land ratio considering not only agricultural land but also forestall land, i.e. .85% per year. This would imply a maximum contribution of capital to agricultural output growth of 11%. See also Crafts (1985, pp. 78-84) and Lains (1990).

Table 2.7
Composition of Agricultural Output

	1853/62	1861/70	1884	1898	1900/09
Cereals	29.6%	34.2%	29.3%	32.9%	31.6%
Wine	44.9%	23.1%	27.4%	27.4%	22.7%
Animal Products	13.0%	22.1%	25.1%	18.9%	24.3%
Other	12.5%	20.6%	18.2%	20.8%	21.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Table A.7

According to the results on table 2.6, capital had a limited role in explaining agriculture growth in Portugal. This may be better seen if the figures in the same table are compared with the figures from a similar calculation carried out by Crafts (1985) for the period 1760-1831 in Great Britain. According to these calculations, the contribution of capital to agricultural growth in Britain was 28% (compared to 4-8% in Portugal), while labour and land inputs only contributed a total of 10% (compared to 30% for Portugal). In conclusion, Portuguese agriculture growth was mainly extensive in its period of maximum growth, between 1867 and 1903, making a greater use of idle labour and land resources, without great improvements in techniques of production or in the use of capital goods. Moreover, as table 2.7 depicts, there were no important shifts in the composition of agricultural production, except the drastic drop in the share of wine following the disease that spread in the 1850s. In 1900/09, according to the contemporary estimates, agricultural output was evenly distributed by cereals, wine and animal products, a situation that practically did not change from 1861/1870.[1]

One reason for that, is that Portuguese agriculture had to

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1. This conclusion is in agreement with Cabral (1974, pp. 60-61), although his periodization of growth is based on Pereira (1983). For the particular case of the wine sector see Martins (1991, p. 655). As we could expect from Boserup (1965), extensive agricultural growth featured in countries with different levels of development: Belgium prior to the late 1860s (Gadisseur, 1973, p. 21); Australia prior to the 1890s (McLean, 1981, p. 6); and Spain prior to the turn of the century (Tortella, 1985a, pp. 82-83).

It should be pointed out here that the other important wine desease in the nineteenth century, the phylloxera, did not have such serious consequences in overall wine production in Portugal (see appendix A).

employ an excessively large labour force, which would imply a lack of incentive to invest in relatively dearer capital goods. Reis (1982) presents sufficient evidence on this regarding the introduction of the threshing machine in the large grain producing properties in the Portuguese south, where the large labour force, low wages and insufficient scale economies hindered investment in machinery before the increase in cereal output from 1890.[1] However, investment in capital goods does not depend solely on the cost of its substitute, labour, but also on the absolute cost of capital or, in other words, on the availability of financial resources for the purchase of machinery. In some cases, the reduction of production costs of machinery is sufficiently large to compensate for the existence of low wages. In the case of Denmark, a country where apparently the problems of capital investment were not so acute as in Portugal, it has been noted that:

> "such implements as the mower, the reaper and especially the binder were labour saving to such a large extent in comparison to hand methods used before that it paid exceedingly well to introduce these implements, not only in the United States where the labour which was thereby saved was costly, but also in other regions where considerably lower wages prevailed".[2]

The conclusion set above regarding the contribution of land,

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1. Cabral (1974, p. 62) gives a radically different view. According to him, larger land-owners would have invested in labour-saving productions to reduce the demand for labour and thus wages. The economic soundness of this interpretation is not clear to me, though.

2. Jensen (1937, pp. 168-69 and 219). On Spain see Simpson (1987).

labour and capital to agricultural growth has a major specification problem, which is the fact that the residual in the estimates is quite large. That residual, which measures total factor productivity growth, probably reflects some improvements in Portuguese agriculture such as the legislative reforms following the liberal revolution and the civil wars; the extension of the internal market through better transport conditions (railways and new roads); and the availability of scale economies due to the increase in total production. We need to recall, however, that the residual also includes the increase in output per productive factor, which does not depend exclusively on productivity growth. For example, the land/labour ratio increased in Portugal from 1870 to 1903, while in Great-Britain it decreased from (at least) 1815/24 until 1865/74.[1] The probable intensification of the agricultural labour effort, due to the fact that the increase in the land/labour ratio was not accompanied by an increase in working animals, which actually decreased slightly between 1870 and 1906, is not measured either. Furthermore, the margin of error for total factor productivity growth is large since it is computed as a residual.

The low investment effort in Portuguese agriculture is also shown by the constantly low ratio of animals per labourer, and the stable share of animal products in agricultural output. Wheat

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1. For Portugal see Lains (1990); for Britain see O'Brien and Keyder (1978, 105)

protection from the 1880s helped to sustain this unfavourable production structure, since the terms of trade within agriculture turned in favour of wheat. The trade-off between the increase in wheat production and cattle raising (and probably wool production) is made clear by a close look at the agricultural conditions of the Portuguese South, the main area for the expansion of wheat output.[1] The lack of an increasing share of animal products and other products, may be linked to this shift of resources towards the cereal sector, due to the protective regime imposed in 1889 and reconfirmed in 1899.[2] The ultimate consequences of this shift in the terms of trade within agriculture was to check the upward trend in agricultural productivity after the turn of the century.

In clear contrast to what happened in agriculture, the index of industrial output shows that industry expanded quite smoothly and regularly throughout 1854-1913, with growth rates close to 2-2.5% per year (see table 2.8). The only exception was the decade from 1861-1865 to 1875, when output increased at about 4% per year. But some doubts must be cast on this *spurt* because before 1865 the series is not continuous and we do not know where the peak year previous to 1875 lays. In any case, the rate of growth

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1. See Reis (1979) and Lains (1987; 1990). Based on import statistics for wheat, given the lack of sufficient official statistics, Justino (1989, p. 111), concludes that wheat output decreased in the last third of the century. However, if consumption rises with population, as it seems to have happened (see appendix A), increasing imports do not imply decreasing domestic output.

2. See Reis (1979)

attained by Portuguese industry was not sufficient to change the predominance of agriculture. According to contemporary estimates, by 1900 industrial output was still only one half of the agricultural output. For industrial output to reach the value of agricultural output by the beginning of the twentieth century, it would have been required a rate of industrial growth about twice as large as the actual rate during 1870-1913.

Table 2.8

Growth of Industrial Output, 1854-1911
(%; per year)

1854-1861	1.78
1861-1875	4.17
1875-1890	1.87
1890-1900	2.66
1900-1911	2.43
1854-1890	2.68
1890-1911	2.54
1854-1911	2.57

Source: Table A.14, last column.

The smooth pace found for industrial growth contradicts the pace predicted by the historians of Portuguese industrialization reviewed in the previous section. The industrial booms hypothesized for the mid-1870s or after 1892 did not happen. Moreover, the industrial growth neither reflects the cycles in agriculture, in particular in agricultural exports, nor is affected by changes in tariff schedules. This last conclusion goes in accordance to the finding that *de facto* tariff policy did

not change considerably throughout the period, as we have already noted (see tables 2.1 and 2.2, above).

The absence of industrial spurts cannot be attributed to the way the indices were constructed. The Reis' index is an aggregation of partial indices weighted by value added per worker employed by industrial sectors, based on less then comprehensive industrial labour census. Because of the difficulty in collecting information on smaller scale and more dispersed industrial activities, these census are biased towards more modern industries, precisely those that we would expect to increase more rapidly (see appendix A).[1]

Consequently, the absence of industrial *spurts* could well reflect the character of Portuguese industry. Reis (1986b) has proposed two sorts of reasons, directly related to the structure of Portuguese industry, that may explain why industrial growth was smooth. The first reason concerns the high import content of industry. In cotton manufactures, for instance, roughly half of the value of its gross output was imported, meaning that a large part of the rewards for industrial growth would leak away. As such, the impact of upward movements in particular industrial branches would be cushioned by weak intersectoral linkages. A token of this import dependence is given by the following list of

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1. On the bias of these indexes see also Reis (1986a, p. 927). According to this author the fact that industries related to the building sector - that is cement, stone, clay and glass - are not included in the industrial output index, leaves out an important source of cyclical movements. It is unlikely, however, the occurrence of an industrial spurt based on the building sector (such an hypothesis has never been put forward by the historiography).

inputs that had to be purchased abroad by the Portuguese industry made by the British Consul in Oporto. According to him:

> "The raw material on which the principal industries are dependent are:
> *Wine growing and export* - Sulphur (from Italy), sulphate of copper (from the United Kingdom) as deterrents of wine disease, staves (from Russia and the United States) for casks, hoop iron (from the U.K. and Germany).
> *Cotton mills* - Cotton (from the U.S., Brazil and Egypt), chemicals (from various countries).
> *Wool mills* - Wool, partly, say one-half, artificial (shoddies) (from the U.K.), chemicals and dyes (from various countries).
> *Tanneries* - Hides (from Brazil and River Plate), bark (from Algeria and Italy), chemicals (from various countries).
> *Soap Works* - Coconut and seed oils (mostly from the U.K. and also from Portuguese Africa), castor beans (from British India via Antwerp).
> *Tinned goods* - Tin plates (from the U.K.), some olive oil (from Italy).
> *Hatters* - Rabbits' fur (from Belgium and the U.K.), leather linings (Belgium), wool (specially prepared), dyes (from various countries).
> *Hosiery mills* - Cotton and wool (all foreign)."[1]

The second reason why there were no significant industrial spurts is that the Portuguese industry was mainly producing for a small and protected internal market, which permitted only limited room for expansion. Consequently, industrial spurts were hindered by the size of the market, given that Portuguese industrial goods could not compete in the external markets, and thus could not surpass the constraints imposed by the smallness of the domestic market. To give another example from the cotton sector, the growth of cotton goods industry by import substitution was

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1. *Diplomatic and Consular Reports [...]* (1910, p. 6).

limited by the fact that by the end of the century imports accounted for just 20% of domestic consumption.[1]

The common factor behind the high import content and the inability to export of the Portuguese industrial sector is, of course, protection. By definition, industrial protection meant that output shifted towards the substitution of manufactures that were imported from countries where natural resource endowments and the technological apparatus differed from those of Portugal. Given that resources such as coal and iron were not produced at competitive prices in Portugal and had no direct substitutes, and given the transfer costs of technology (and capital), imports took place. But what is important to stress is that the major factor behind the need to import industrial inputs was protection. And that is the true origin of the divorce between Portuguese industry and the country's resource basis, or between the secondary and primary sectors.[2] In other words, more important than natural resources endowments is probably the fact that Portuguese industrial structure was shaped not on the country's comparative advantages, but on tariffs.

Thus, the scarcity of the natural resources that were available to the first industrializers could explain why Portugal

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1. According to Pedreira (1991, p. 555) this limitation was already to be seen in the cotton printing industry as early as in the 1870s.

2. This problem is probably just a descriptive element of backwardness. Gerschenkron (1962), when discussing Bulgarian industrialization from 1878-1930, concludes that "the hope that industry in a very backward country can unfold from its agriculture is hardly realistic." (*idem*, p. 216).

did not enter this first wave of modern economic growth. Most probably, however, it does not explain why Portugal did not experience the rapid growth of the second wave of industrialisers, formed essentially by the countries of the north-western European periphery during the third quarter of the nineteenth century. The difficulties for Portugal to industrialize on the basis of mass-production of cotton goods, iron or steel seems evident, but the same does not apply regarding industrialization based on the exploitation of agricultural or forest resources, or water, as happened to the second industrializers. The fact that this relationship between industry and agriculture was weak in the case of Portugal, does not imply that Portugal had an unfavourable resource basis. It could signify that that resource basis was not sufficiently exploited. In the specific case of land, for instance, Schultz argues:

> "Farm land has two components, a natural endowment component and a capital structure component. The latter is a consequence of past investments. Theorists implicitly often mean by land only its natural endowment. But it is for the most part an empty concept because so many of the differences in productivity of farm land are man-made. Investments in land over time do matter."[1]

Thus in a backward country the actual pattern of land (or other

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1. Schultz (1983, p. 17). See the same point in Boserup (1965, p. 13). This is what Kelley and Williamson (1973, p. 451) labelled the "'new view' of agricultural development", which helps explaining explains how a resource (i.e. land) poor country as Japan achieved fast growth of agricultural labour productivity (1887-1915), precisely through the "accumulation of technical or purchased inputs per farm worker" (idem, p. 456).

natural resources) use does not disclose its potential use, and in particular its potential integration with the industrial sector. In close agreement with Schultz, Kuznets (1953) asks why some societies did not overcome their problems by appropriate changes in technology, while others did so:

> "(...) the have-not societies are poor because they have not succeeded in overcoming scarcity of natural resources by appropriate changes in technology, not because the scarcity of resources is an inexorable factor for which there is no remedy."[1]

Thus, more important than the availability of natural resources is the capacity to exploit them, that is, the capacity to finance the needed investment. Natural resources and capital investment can be complementary.[2]

Table 2.9 depicts the main transformations of the structure of Portugal's industrial value added between circa 1850 and circa 1910. The data on which that table is drawn is incomplete and

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1. Kuznets (1953, p. 12). For the same line of argument regarding Portugal see Justino (1989, pp. 242-23).

2. According to Vanek (1969, p. 152) natural resources and capital have a "strong degree of complementary" in the United States. This fact could explain, according to him, the "Leontieff paradox" (that is that the United States exports are intensive in the scarce production factor, labour). Baldwin (1971, pp. 128-29, 142), agrees with the Vanek's first point but not with its implications.

O'Brien and Keyder (1978, pp. 154, 162) conclude that natural resources are important in shaping the agricultural and industrial structure of the countries they studied (Britain and France), but not in explaining different levels of aggregate (labour) productivity. Thus the conclusions from those authors regarding the importance of natural resources in explaining different agriculture productivity levels in Britain and France cannot be applied to a comparison between countries with different composition of physical and human capital stock. A conclusion that is most relevant for the case of Portuguese industry. See also Schultz (1983, p. 12).

different sources point to different weights around 1910, specially for cottons and metallurgy. In any case, a decline in the share of textile industries, in particular woollens, is noticeable. Besides that, the major features in the table are the increase of the food industry, due to flour milling, a possible increase in metallurgy, and the emergence of the fast growing canned fish industry.[1]

Let us now try to understand the extent to which Portuguese industrial structure was biased in respect to its comparative advantages - a bias that may go far in explaining the pace of industrial growth. Although the share of textiles in total industrial value added decreased, by 1910 Portugal still had one of the largest shares of industrial labour in the sector, close to those of France, Italy and Spain, as well as Switzerland (table 2.11). Despite that, Portugal did not have a comparative advantage in textiles. In fact, whereas Portuguese value added per industrial worker was on average less than 1/2 of British value added, in the cotton and woollen industries it was just 25% and 15%, respectively.[2]

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1. The canned fish industry is not a modern industry in Portugal because, once again, a large share of its inputs were imported, in particular the tin plates. See below chapter 4.

2. Reis (1986b) gives a ratio of 50% for Portuguese/Britain value added per worker, including tariffs in the Portuguese case. If we assume an average level of tariffs of 30% and an import coefficient on the 30-50% range, that ratio would be reduced to 45%. The ratios given in the text for cottons and woollens do not include tariffs either. See Lains (1897, p. 498).

Table 2.9

Structure of Industrial Value Added (%)

Sectors	c.1850	c.1910	
		I	II
Cottons	25.9	22.0	17.5
Woollens	34.9	19.9	18.6
Linens	3.5	4.8	4.0
Food indus.	6.7	13.8	11.4
Cork indus.	1.1	5.8	6.9
Tobacco	9.3	10.5	7.0
Metallurgy	8.2	8.9	17.5
Paper	3.4	2.1	2.2
Ceramics	6.7	3.0	3.9
Soap indus.	0.3	2.1	1.7
Canned fish	-	7.1	9.3
TOTAL	100%	100%	100%

Source: Table A.12.

Table 2.10
Structure of Industrial Exports

Sectors	1880/89	1890/99	1900/13
Cottons	6.4	27.8	26.9
Woollens	2.6	2.6	1.0
Linens	0.7	0.5	0.1
Food indus.(*)	17.8	14.8	16.7
Cork indus.	33.2	19.9	17.5
Tobacco	0.0	0.0	0.0
Metallurgy	6.7	3.7	2.9
Paper	0.0	0.0	0.0
Ceramics	0.4	0.4	0.3
Soap indus.	0.0	0.0	0.0
Canned fish	32.1	30.3	34.7
TOTAL	100%	100%	100%

(*) Olive oil, flour, and fruit preserves.
Source: appendix C.

Table 2.11
Structure of Industry: selected European Countries (%)
A - Composition of Labour Force (c.1910)

	Mining	Food Bever. Tobac.	Texti. Cloth. Leath.	Wood prods.	Pulp Paper Print.	Stone Clay Glass	Metals Machi-nery	Chemi-cals	Other
Portugal									
1891	5.6	22.2	43.6	8.4	2.6	5.0	11.5	1.0	-
1917	-	25.0	37.0	14.0		7.0	12.0	5.0	-
Belgium	16.6	11.0	30.2	10.0	2.8	5.9	15.7	3.8	3.0
Denmark	-	22.5	19.7	-	7.6	15.1	23.0	6.0	6.1
Finland	-	11.8	15.9	27.1	10.0	8.0	19.1	2.4	5.6
Norway	4.8	14.5	19.1	19.6	3.4	9.5	24.6	4.6	-
Sweden	3.8	10.1	15.9	16.2	10.5	12.4	27.2	4.0	-
Switzer.	-	8.0	38.2	7.3	5.9	5.6	32.3	2.7	-
France	5.2	9.6	47.8	12.9	3.2	3.9	15.1	1.4	0.8
Italy	4.6	14.2	37.1	10.3	4.0	8.5	18.1	2.7	0.5
Spain	11.5	13.1	50.0	9.0		-	7.8	1.4	7.0
G.Britain	14.7	13.5	35.0	3.9	4.8	2.3	23.3	2.4	-

B - Composition of Production (1913)(*)

	Food Bever. Tobac.	Texti-tiles	Basic metals	Metal pro-ducts	Chemi-cals	Other
Portugal	18-24	40-47	0	9-18	2	18-22
Belgium	23	19	18	24	7	9
Denmark	44	12	0	12	5	27
Norway	27	7	1	20	7	38
Sweden	16	7	8	29	3	37
France	11	19	11	31	6	22
Italy	16	38	7	12	7	20
U. Kingdom	20	19	7	19	6	29
W. Europe	19	18	10	24	6	23

(*) Manufacturing industries only.
Sources:
Part A: Portugal: Moura (1974, p. 115) and Reis (1986a, p. 920); Belgium: Brabander (1981, p. 82); Denmark and Finland: Jorberg (1976, p. 476); Norway: Hodne (1975, p. 290); Sweden: Montgomery (1933, p. 178); Switzerland: D.F.E.P. (1927, p. 155); France and Great Britain: Bairoch (et al.) (1968, pp. 173 and 189); Italy: Zamagni (1987, p. 78); Spain: C.E.N. (1945, p. 224);
Part B: Paretti and Bloch (1956, pp. 212-14) and table 2.9 for Portugal.

The comparison of the structure of industrial exports with that of industrial value added (tables 2.9 and 2.10) leads to the same conclusion regarding the competitiveness of the textile industry. During 1880/89, that is before cotton exports to the African colonies were protected, the proportion of cottons in total industrial exports was considerably lower than their proportion in total industrial value added, 6.4% against 26% (1850) or 18-22% (1910). Following the protection of the colonial markets, Portugal's exports of cotton goods went up to more than a quarter of total industrial exports. Woollens' exports, on the other hand, were rather limited because they were not protected. Again we may see that its importance in the structure of Portuguese industry is largely inflated. By 1910 woollens contributed with 19-20% for total value added whereas they only contributed with 1% for industrial exports. Portugal, a small, low wage country, had high tariff barriers protecting sectors where capital/output ratios and economies of scale were presumably large: cotton yarn and cloth, for instance. That economies of scale were difficult to attain in these sectors, where tariff barriers were at the 30-50% level, may be shown by the following example: in 1891 one of the largest Lisbon cotton plant was producing 67 different kinds of yarn, because the market was too small for it to specialise in just a few counts of

thread.[1] Within the cotton industry, protection was also granted to printing, since at least 1837. This protected industry was a relatively intensive user of capital and energy, compared to cotton spinning and weaving, or to the industries of wool, metal and tobacco.[2]

By comparing tables 2.9 and 2.10 we may depict comparative advantages for Portugal in only a few industries, namely food, cork and canned fish. The comparatively low degree of diversification of the industrial sector appears even more clearly in table 2.11. Natural resources based industries, such as wood products, pulp and paper, stone, clay and glass did not develop as in some other European countries. Metallurgy also had a relatively low importance in comparison to the other countries in the table, except Spain.

The argument according to which industrial development was hindered by a biased industrial structure as a consequence of tariffs should not be pushed too far, though, because it leaves open the question of why in the first place tariffs were imposed. In fact, it has to be taken into account that tariffs might be imposed for economic reasons, and may not be just the result of wrong choices of economic policy. When the potential for productive investment is narrow, it may be economically reasonable at the individual level to lobby for tariff

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1. See Reis (1986b, p. 85). On the case of Italy see Fenoaltea (1968, p. 420).

2. Pedreira (1991, p. 537).

protection; on the other hand, when the range of investment opportunities is wider, protection may be unnecessary. The discussion of the Italian case is most enlightening in this respect. Contradicting Gerschenkron's view, Fenoaltea does not "disapprove" of the protection granted to the Italian textile industry because textiles are a consumption good the production of which is labour intensive and requires unsophisticated capital equipment. Why then was protection successful in Italy and not in Portugal?[1] - Moreover, there may be sound economic reasons for a country poorly endowed in capital to invest in capital intensive industries if capital substitutes for another scarce resource: skilled and "reliable" industrial labour. This is a basic argument in Gerschenkron's typology of industrialization.[2] It is true that industrial exports may be hindered by protection if protection has negative effects in the country's industrial structure. However, if tariff protection reflects low domestic investment opportunities, then the ultimate cause of low industrial exports are low investment opportunities and not protection. As in many issues in economic history causes and effects are hard to isolate, but that does not mean that we do

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1. Fenoaltea (1968, pp. 428-29). Risking to raise questions much beyond the scope of our present analysis, it has to be noted that much of the questions raised by Portuguese nineteenth century economic history could be solve by comparing to developments later in the 1950s and the 1960s, when, precisely, Portuguese cotton industry developed considerably.

2. Gerschenkron (1962, pp. 8-9). See also Baldwin (1971, pp. 130-31) who argues that one of the reasons why in many twentieth century LDCs foreign investment went to a large extent to export-oriented, large scale, and capital intensive natural resource industries was because of lack of skilled labour.

not take into account the possibility that causality may run in both directions. If one is looking for causes of decadence, then policy choices (protection) and not growth potential (investment opportunities) tend to appear as the crucial factor. In any case the low trade share of Portugal's GNP should appear only as a distinctive element of the country, and not as an explanation of slow growth.

2.4 - Growth and exports

By Western European standards, the share of foreign trade in Portuguese national income in 1913 was relatively low, comparable only to the shares exhibited by larger countries such as Italy and Spain (table 2.12). But size does not go far in explaining differences in trade shares across countries, as chart 2.1 renders evident. Chart 2.2 shows that the trade shares in national income are instead significantly and positively correlated to the level of income per capita. In chart 2.3 the height of import tariffs appears as significantly and negatively correlated to trade shares. Finally, chart 2.4 depicts a negative

correlation between tariffs and income per capita.[1]

Table 2.12

Income, Country size, Trade, and Tariffs in Europe (c. 1910)

	GDP per cap. ($1980)	Popu-lation (000)	Total GDP ($000)	X/ GDP (%)	M/ GDP (%)	Tariff level 1902 (%)
	(1)	(2)	(3)	(4)	(5)	(6)
Portugal	(728)	6 061	4 412	13.6	13.2	56
Belgium	2748	7 605	20 899	(30.3)	(51.4)	13
Denmark	2525	2 833	7 153	30.3	32.0	18
Finland	1434	3 027	4 341	25	31	na
Norway	1845	2 447	4 515	29.5	27.6	12
Sweden	1794	5 621	10 084	21.7	16.8	23
Switzer.	(3105)	3 864	11 998	(18.0)	(32.1)	7
France	2192	39 770	87 176	15.7	19.1	34
Italy	1429	35 192	50 289	9.3	14.0	27
Spain	(1526)	20 345	31 046	11.8	10.3	56
Germany	2045	66 978	136 970	19.5	21.5	25
G.Britain	3015	41 289	124 487	23.0	29.3	na

Notes and Sources:
Columns (1)-(3): table 1.1 and Mitchell (1975, pp. 19-24).
Columns (4) and (5): Bairoch (1976a, pp. 79-80), Heikhinen and Hjerppe (1987, p. 228), Justino (1987, p. 460), Lévy-Leboyer and Bourguignon (1985, p. 332), Maddison (1962, p. 14; 1987, p. 695) and Prados (1988, p. 207). Except for Finland and Spain, trade ratios were corrected according to Federico and Tena (1989), their indexes being adjusted by freight rate factors. The values in these columns should be compared to Deutsch and Eckstein (1961, p. 275), Grassman (1980, p. 131), Hanson (1986, p. 93), and Kuznets (1966, pp. 312-13),
Column (6): *Parliamentary Papers* (1905, p. 354), corrected as in Lains (1987, p. 487).

1. Tariffs are related to trade and not to import shares for the sake of homogeneity in the charts. The simple correlation coefficient between tariffs and import shares is of course larger (-0.740 vs. -0.684).

Chart 2.1 – Trade and Size

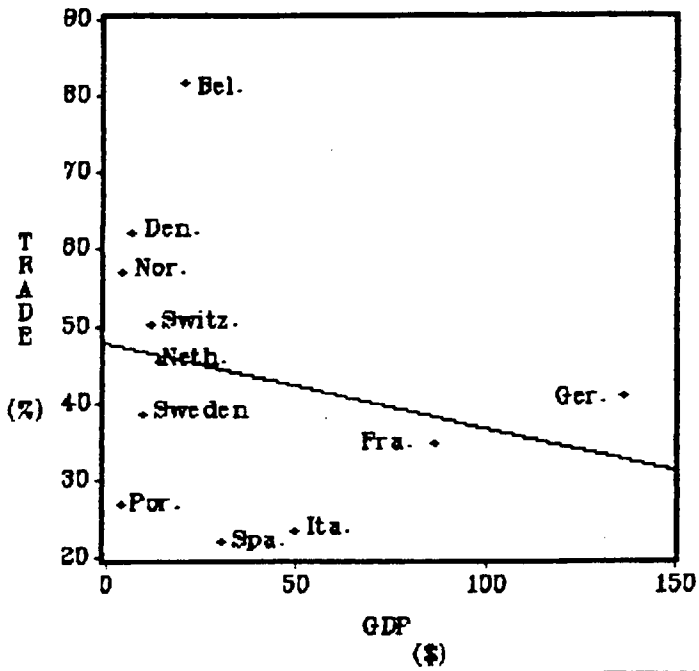


Chart 2.2 – Trade and Income

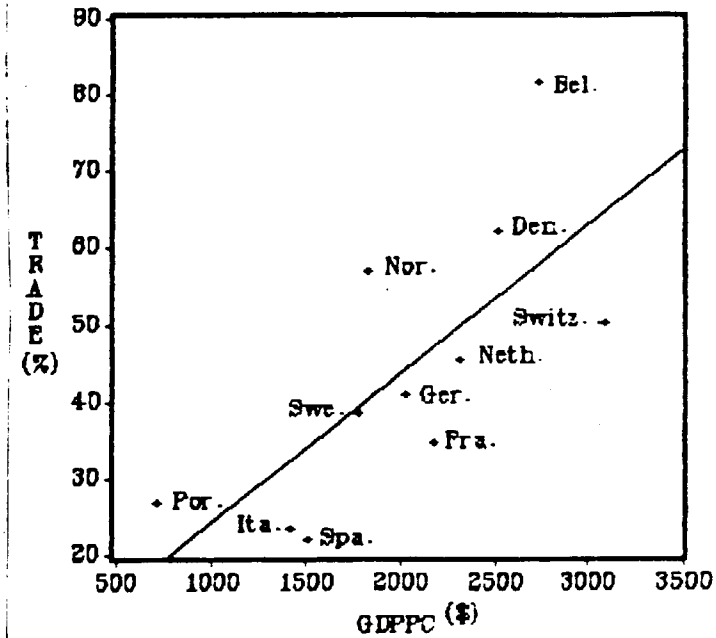


Chart 2.3 – Trade and Tariffs

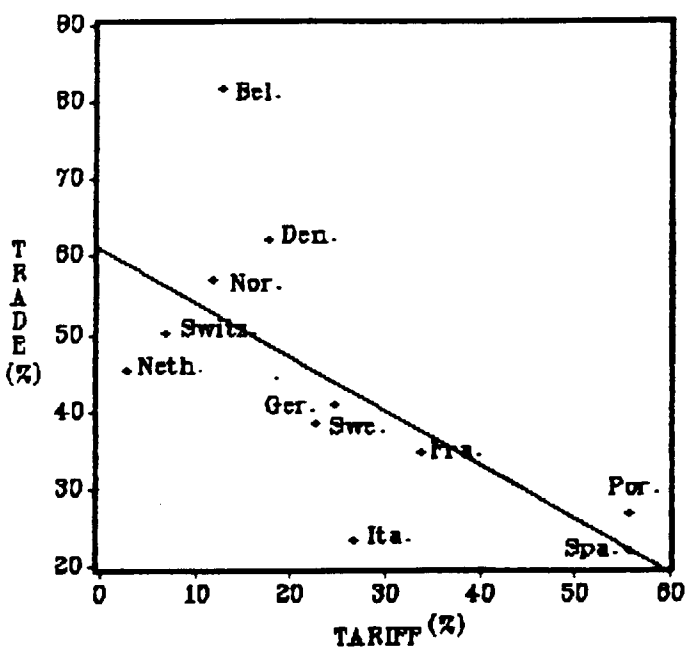
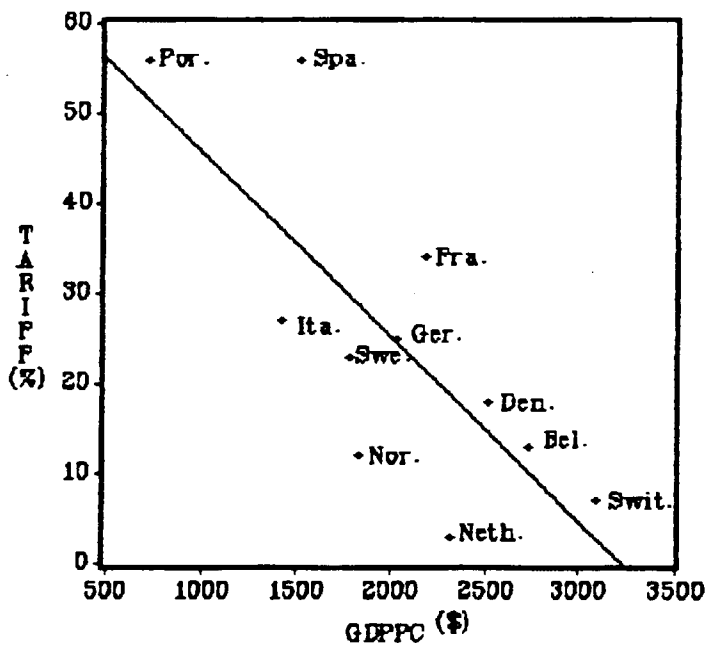


Chart 2.4 – Tariffs and Income



Notes:
TRADE = (X+M)/GDP; GDP = total GDP;
GDPPC = GDP per capita; TARIFF = Tariffs/Imports
Source: Table 2.12

These relationships do not help us understand the reasons for and the consequences of Portugal's low share of international trade. Income per capita affects trade shares through differentials in productivity, for instance, as well as trade shares affect income per capita. Trade shares may also be hindered by tariffs and tariffs may depend on the level of income per capita. In fact, historically poorer countries have more difficulty in raising fiscal revenue by direct taxation on income or property and thus depend to a larger extent on tariff revenue.[1]

Inferences regarding the determinants of low shares of foreign trade in national output can be quite inconclusive. However, there is a considerable amount of literature in history and development economics assuming foreign trade, that is exports, as an exogenous variable in economic growth. These *export-led* growth models were put forward in order to explain British industrialization during the eighteenth century, or the industrialization of Scandinavia in the second half of the nineteenth century, or third world development after World War

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1. Regarding the case of Portugal see Justino (1988) and Lains (1987). One possible inference from this complex set of inter-relationships is that the level of GDP per capita affects trade shares via its effect on tariffs. This circle has been identified by Saraiva (1972, p. 27) who is mainly concerned with the role of education and literacy. According to this author, a small country like Portugal cannot solve its economic problems in autarky, and has to foster trade with other countries, what could be promoted by foreign policy. But then he question the capacity of Portuguese politicians to do so, who are not backed by a literate population, which in turn is not literate because the country is poor and badly equipped.

II.[1] In the case of Portugal, references regarding the role of exports during the second half of the nineteenth century have an ambiguous character. Exports would have led growth only in agriculture and only up to a certain point in time. Referring to the role of foreign markets in the development of the country, Pereira (1983) concludes that they were "simultaneously a factor of progress and retardation."[2]

The controversy over the role of exports in economic growth is far from satisfactorily solved in spite of the vast domestic and foreign literature on the subject. The disagreement regards not only the intensity of the relationship of exports and growth but also the direction of causation. In their relation to growth, exports are considered as an *engine* by Robertson (1938) and Nurkse (1961), a *handmaiden* by Kravis (1970), a *sputtering engine* by Williamson (1980), or just as a *trailer* of growth by Findlay (1985).

The engine of growth model, as Nurkse (1961) presented it, was in motion during the nineteenth century, when international markets were buoyant because of the growth of demand for primary products in Europe, and in particular in Great Britain. According to the same author, the possibilities for the demand push of

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1. For a first critique of the export-led growth model during British industrial revolution see Saul (1965). Short summaries of this debate are given by McCloskey (1981, pp. 140-42) and Crafts (1985, pp. 129-37). Regarding the Scandinavian countries see next chapter.

2. Pereira (1983, p. 10). See also Cabral (1979, p. 69) and Sideri (1970).

exports weakened in the twentieth century when adverse income elasticities for primary products emerged in the industrialised World. This view was first contested by Kravis (1970), who shows that export growth does not differentiate successful from unsuccessful countries in the nineteenth century. International trade conditions were not significantly different for twentieth century developing countries, as opposed to successful nineteenth century countries of recent European settlement. Besides, successful exporters in the post World War II period (1948-1966) increased their shares in world markets for their traditional exports without necessarily enjoying the "good fortune in world demand for their particular exports". Accordingly, success in exports is more probably related to internal supply conditions of each country and not to conditions on international markets.[1]

Emery (1967) analyses the correlations between rates of growth of exports and GNP per capita. He recognises that simple correlation is not a test for the export-led growth model because the direction of causation is not tested, although at some stages he assumes that causation runs from exports to growth.[2] I have replicated his exercise in table 2.11 by estimating time-series regressions of real GNP per capita growth on real export growth, for a sample of 9 countries during 1865-1913.

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1. Kravis (1970, p. 868). Hanson (1977) draws a similar conclusion for a sample of 12 less developed countries during the 1860-1900 period. For the case of Portugal see Lains (1986).

2. Emery (1967, p. 478).

Table 2.13
Regressions of Real GNP per capita on Export Growth
(Dependent variable: YG)

Time-series, 1865-1913

Country	C	XG	R2	DW	F	SER	Q	N
Portugal	0.014	0.209	0.204	1.72	4.86	0.044	4.81	16
	(0.771)	(2.203)						
Denmark	0.012	0.097	0.196	2.33	12.46	0.016	10.02	48
	(4.601)	(3.530)						
Finland	0.020	-0.001	-0.022	1.20	0.00	0.057	7.99	47
	(2.128)	(0.016)						
Norway	0.005	0.248	0.372	1.34	28.22	0.015	18.66	48
	(2.095)	(5.313)						
AR(1)	0.006	0.226	0.428	1.99	17.84	0.014	10.09	47
	(1.758)	(5.375)						
Sweden	0.016	0.205	0.094	2.59	5.89	0.050	17.55	48
	(1.975)	(2.427)						
France	0.018	-0.024	-0.020	2.05	0.08	0.039	13.58	48
	(2.881)	(0.281)						
Italy	0.012	-0.048	-0.003	2.57	0.87	0.041	28.77	48
	(2.031)	(0.934)						
Germany	0.012	0.067	-0.013	2.36	0.42	0.036	13.45	48
	(1.555)	(0.646)						
UK	0.004	0.234	0.181	2.23	11.39	0.023	7.35	48
	(1.011)	(3.375)						

Pooled

Sets	C	XG	R2	DW	F	SER	Q	N
All	0.009	0.172	0.077	2.22	4.27	0.009	23.28	40
	(2.739)	(2.066)						
Small	0.004	0.338	0.286	1.87	8.62	0.008	3.80	20
	(0.828)	(2.935)						
Small+UK	0.004	0.318	0.291	2.01	10.86	0.008	5.07	25
	(1.065)	(3.295)						

Notes: YG, XG stand for yearly real growth rates for income per capita and exports, respectively. t-statistics between brackets. R2 adjusted for degrees of freedom. Chi-square statistics (Q) computed with 20 lags (for N=40-48), 15 lags (N=25), 10 lags (N=16-20). The pooled series are composed of 10 years trend yearly rates of growth for GNP per capita and exports, for each country, except Portugal, for lack of yearly data. Small countries: Denmark, Finland, Norway and Sweden, and large countries: France, Germany, Italy and the United Kingdom.
Sources: Portugal: appendixes A and C. Denmark: Johansen (1985, pp. 113-14, 190-98, 217-218, 390-97); Finland: Hjerppe (1989, pp. 195-96, 259-61), Vattula (1983, pp. 18, 232, 458).

Sources for table 2.13 (contd.)
Norway: Maddison (1982, pp. 180, 183, 249), Mitchell (1975, pp. 511, 516, 818, 824), Hodne (1975, pp. 501).
Sweden: Johansson (1967, pp. 138-45, 150-61). **France**: Levy-Leboyer and Bourguignon (1985, pp. 329-32, 344-47), Maddison (1982, pp. 180, 182), Mitchell (1975, pp. 773-74). **Germany**: Hoffmann (1965, pp. 454-55, 530-31), Lewis (1981), Mitchell (1975, pp. 817, 821, 510, 514). **Italy**: Ercolani (1975, pp. 421, 427-28, 432-34), Mitchell (1975, pp. 510, 515, 773, 775, 817, 823). **United Kingdom**: Imlah (1958, pp. 96-98), Feinstein (1972, pp. 120-21), Mitchell (1975, pp. 818, 826).
All data converted into indexes (1900=100).

Table 2.13 shows exports to be correlated to growth in one large and four small countries, respectively the United Kingdom, Portugal, Denmark, Norway and Sweden. The value of the coefficient of the real export growth rate (XG) for Denmark (0.097), although significant, is rather lower than those of the other countries for which we have obtained regressions with a good fit. If this is correct, then we have to conclude that there were significant differences of the role of exports within the Scandinavian countries. In fact, the estimated coefficients for Norway and Sweden are roughly double the size of the Danish coefficient, whereas in the case of Finland exports are not correlated to growth. The coefficient found for Portugal (0.209) appears in a plausible range of those for Norway (0.226), Sweden (0.205), and the UK (0.234).[1]

These results set up the basis for the study of Portuguese exports that follows in the next chapter. However, we have to

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1. It should be noted that the rate of growth of Swedish GDP has been recently revised downwards (see Krantz, 1988). This revision is not available in a yearly series and, as such, cannot be used here. However it is clear that it would imply a larger coefficient for Sweden.

bear in mind the fact that the conclusion according to which a 4% increase in exports is associated with an increase in income per capita of about 1% in the case of Portugal and other countries, should be interpreted carefully. This is so because increases in exports may not be exogenous but dependent on general economic growth - the causal relation does not necessarily run from exports to growth. It is generally expected that export growth bring benefits of a different kind than growth of any other segment of aggregate demand of equal size.[1] However it may be the case that the unresponsiveness of supply, resulting from factors such as low investment rates, hinders the production of exportables and thus export growth.[2]

Moreover, the supply of exportables can be related to the structure of the domestic demand. According to Linder (1961), the export potential develops if only substantial domestic demand to the product exists.[3] Saul (1965) and Crouzet (1980) argued that the "Linder hypothesis" holds for British exports growth during the Industrial Revolution. That hypothesis is further confirmed by noting that the export goods that expanded rapidly in the international markets during the second half of the nineteenth century were sold in the domestic markets of the countries of origin at shares never below 50%, before or during the periods of

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1. See for instance Caves (1970, p. 244).

2. See Beckerman (1965, p. 65)

3. See also Tharakan (1985, p. 73).

more intense export growth for each product. That was the case of wheat exports from the United States, meat exports from Argentina, wool exports from Australia, butter exports from Denmark, or timber exports from Sweden.[1] Exports should not be considered *a priori* as an exogenous variable that can be controlled by economic policy in order to promote growth, because it may be the case that, as Bairoch (1976a) argues:

> "(...) ce sont les mouvements de la croissance économique qui précèdent ceux du commerce éxterieur et non l'inverse. (...) en règle générale nous pensons que c'est la croissance économique qui a été le moteur de l'expansion du commerce extérieur en Europe au XIXe siècle (...)"[2]

A joint analysis of the trends of export growth, of shifts in their product composition, and shifts in the composition of domestic supply, may help to understand further the relation between growth and exports, and to conclude whether exports can be considered as exogenous to growth or not. If export growth is associated to shifts in export composition, and if these shifts *follow* similar shifts in domestic supply, the case for export-led growth is unlikely. If export growth is more dependent on overall economic growth, the ability to develop export promoting policies is reduced.

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1. See Butlin (1984, pp. 29, 33), Crouzet (1980, p. 77), Jorberg (1976, pp. 396, 470), Lipsey (1963, p. 52), and Platt (1972, p. 262).

2. Bairoch (1976a, pp. 159-160). This conclusion is based just on the analysis of the fluctuations of the export and national output curves over three cycles. I have endeavoured on a more complex analysis of the causal relationship between exports and growth for 9 European countries (1865-1913) by testing causality according to Granger's (1969) definition and method. See Lains (1991).

CHAPTER 3

GROWTH AND SLOWDOWN OF EXPORTS, 1842-1913

3.1 - Introduction

This chapter presents trends and cycles in the values, volumes and prices of Portuguese exports during the period from 1842 to 1913. From the discussion in the previous chapter, it should be clear by now that the analysis of export trends should not be considered as an element of particular importance in understanding Portuguese economic backwardness. My aim here is just to understand the problems that this particular sector had to expand, and those problems should be understood in the general framework of a poor country with overall growth limits imposed by

its unfavourable starting position.

Export growth is analysed here in relation to fluctuations in international markets. Comparisons with other small countries with better export performance and with Mediterranean competitors will help to explain why Portugal's export growth slowed down as it did by the mid-1880s. The review of the experience of Scandinavian exports will reveal how flexibility in adapting to changing conditions in foreign demand may be determinant for export growth. It will be shown that such flexibility was related to shifts in domestic supply.

The analysis of Portuguese exports will go deeper in respect to two important export branches, cork and wines. In this field Portugal's experience will be compared to that of Spain and Italy. Supply constraints will appear at least as important as the capacity to secure international markets through commercial negotiations.

Official statistics for foreign trade started in 1842 but provide a continuous series only from 1865. Thus more attention will be paid to the years 1865-1913, although some comments for previous decades, in which the basis for the rapid expansion of foreign trade were laid, will also be given. These statistics are revised in an appendix to this chapter, where their values will be compared to those registered in the statistics of Portugal's main trade partners. Official figures for exports are much less reliable than those for imports, and it has been estimated that exports were undervalued by as much as 50% by 1900. The accuracy

of official export volumes is satisfactory, and the errors in valuation can be basically imputed to variations in export prices. The major difference between the new figures presented here and the official data for Portuguese foreign trade relates to the years post 1891. Portugal left the gold standard in that year and, despite the large exchange rates fluctuations that followed, export values continued to be registered at par exchange rates. Since imports continued to be registered at "market" exchange rates, the revised balance of merchandise trade becomes radically different. For example, deficits on the balance of merchandise trade are no longer persistently negative. The analysis in this chapter is consistently based on the revised series, although growth rates from official sources are also presented to allow for comparisons. Correction coefficients for the official data are presented in appendix B, and appendix C presents the main official series of Portugal's trade.

The structure of the chapter is as follows: section 3.2 presents a periodization of export growth and relates it to shifts in international trade for foodstuffs and to general conditions in European agriculture; section 3.3 discusses the export experience of Scandinavia as a comparative framework that will prepare to the discussion in section 3.4 concerning the constraints of Portugal's export growth; finally section 3.5 analysis the difficulties for Portugal to take advantage of the complex net of commercial negotiations within Europe.

3.2 - Trends and fluctuations: the external scenario

Throughout Europe foreign trade expanded rapidly over the half-century to 1913. Portugal was no exception. Between mid-century and the outbreak of the War, the revised values for exports and imports increased roughly four-fold, that is at trend growth rates of approximately 2.5% per year. The corresponding figure for volumes is only slightly higher at 2.8% per year.[1] Fluctuations in Portuguese exports, in nominal and constant prices are depicted in graph 3.1. Table 3.1 shows the yearly growth rates estimated from peak to peak, defined as those years in which the deviations of exports and imports from their respective trend lines are greatest. As the figures before 1865 are not continuous, and the trend could not be estimated, the reference years in the tables are just best guesses. Turning points for cycles for values and volumes coincide, except for

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1. Unit value indexes for export and imports were computed according to the Fisher "ideal" formula (a geometric average of Paasche and Laspeyres indexes). The coverage of these indexes is on average 83.3% of total export value, comprising a list of 39 items, and 74.9% of total import value, comprising 34 items (see Lains, 1986).

Among the many references for nineteenth century foreign trade growth rates see Bairoch (1976b). For countries not considered in that book, see Lampe and Jackson (1983), Pamuk (1982), and Prados (1988). For a detailed overview of Anglo-Portuguese trade for the first half of the nineteenth century see Bonifácio (1987) and (1989b, pp. 35-116).

slight differences. Export prices fluctuated severely, particularly after Portugal left the gold standard in 1891. These price fluctuations show up as sharp differences in medium-term trend growth rates for the values of Portuguese exports. Fluctuations in value in the last two periods in table 3.1 are thus largely due to fluctuations in Portugal's exchange rate against the currencies on the gold standard, namely the pound sterling.

Graph 3.1 – Exports (revised)

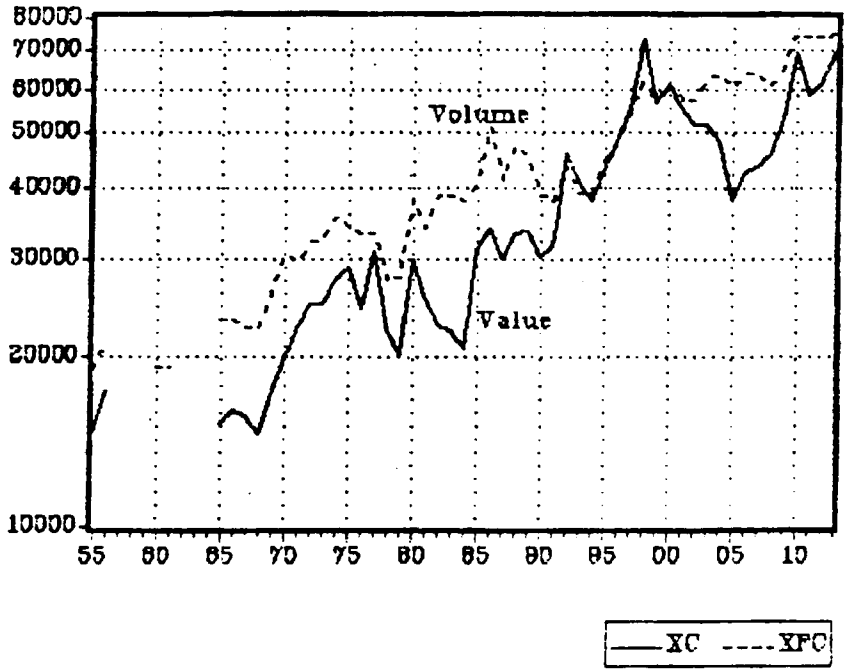

Table 3.1
Growth of Exports
(yearly peak to peak growth rates, %)

Periods	Value		Volume
	Official	Revised	
1842-1856(1)	6.09	-	2.86
1856-1866	2.04	0.02	1.64(*)
1866-1875	3.62	6.72	4.89(≠)
1875-1886	1.37	1.47	3.44(+)
1886-1898	1.48	6.61	1.62
1898-1910	1.16	-0.41	1.57
1856-1910	1.84	2.75	2.49
1865-1913 (trend)	1.52	2.85	2.34

(1) Up to 1865 the series are not continuous and the years chosen as peaks for the first two periods in the table are best guesses.

(*) 1856-65;(≠) 1865-74; (+) 1874-86

Notes: The corrections apply only to official values (i.e., prices), and not the volumes. Peak years were estimated in relation to a trend linear regression of the type, Log X = c + a.time + ut
Last row in the table is the coefficient "a" for the regression for the relevant periods. The complete series start in 1865, thus until that year the peak years in the table are only proximate.

Source: Computed from appendix C.

The growth in export volume is divided into six sub-periods of nearly one decade each. The relatively high growth rate for 1842-1856 is probably overstated because 1842 may be a low point in the cycle.[1] During the following decade (1856-1866), export

1. As there are no trade statistics for Portugal between 1831 and 1842, as well as no price indexes for the earlier period, the conclusion that 1842 was a low point is inferred from partial evidence in, for instance, Justino (1988-1989). See also Bonifacio (1987).

volume growth registered a slowdown, which was reversed in the years from 1866 to 1886. These were decades of exceptional growth. After 1886 and till 1913 the growth rates for export volumes returned to the levels of the initial decade of 1856-1866. In spite of the high growth rates of the years 1866-1886, the Portuguese performance for 1855-1913 stood around the median for Europe as a whole (table 3.2). Compared to more successful small countries the growth of exports from Portugal lagged in the periods following 1886 and in particular after 1895. The changing rhythm of the period after 1886 was associated with important shifts in the composition and direction of Portuguese exports.

The purpose of the selection of the countries to which Portugal's export growth is compared is twofold. Firstly it was found insightful to compare Portugal with countries of similar size but with more success in international trade. By looking into the experience of the Scandinavian countries we may try to understand how they managed to keep high growth rates of exports by shifting export composition and adapting to changing conditions in world markets. Given their small size and consequent greater dependence on exports, such capacity of adaptation revealed as an important distinctive element of economic growth in these countries. The second set of countries, France, Italy and Spain, has been chosen to include those countries with which Portugal competed in the markets for Mediterranean products.

Table 3.2
Growth of Exports: selected European Countries
(peak to peak growth rates, %)

		(1856-65)	(1866-75)	(1875-86)	(1886-98)	(1898-1910)
Portugal	value	0.02	6.72	1.47	6.61	-0.41
	volume	1.64	4.89	3.44	1.62	1.57
			(1865-80)		(1880-94)	(1894-1913)
Denmark	value		4.47		1.63	5.35
	volume		4.55		2.80	3.20
			(1868-80)		(1880-95)	(1895-1913)
Finland	value		8.35		1.00	5.96
	volume		7.52		1.61	4.20
			(1866-73)	(1873-82)	(1882-96)	(1896-1913)
Norway(*)	value		8.34	0.19	1.33	5.92
	volume		4.03	1.59	2.11	4.53
		(1851-62)	(1861-70)	(1870-82)	(1882-96)	(1896-1913)
Sweden	value		6.42	3.96	2.25	4.98
	volume	6.57(*)	7.98	2.64	3.24	3.35
		(1860-66)	(1866-75)	(1875-89)		(1889-1913)
France	value	5.73	2.20	-0.32		2.61
	volume	8.07	4.46	0.80		2.22
			(1863-72)	(1872-84)	(1884-99)	(1899-1913)
Italy	value		6.98	-0.68	1.95	4.06
	volume		4.26	0.48	1.56	2.80
		(1855-64)	(1864-73)	(1873-82)	(1882-97)	(1897-1912)
Spain	value	1.26	5.85	2.96	2.30	0.43
	volume	2.67	6.29	3.43	4.61	0.01
		(1856-65)	(1865-74)	(1874-83)	(1883-1901)	(1901-13)
U.K.	value	4.95	3.12	0.56	1.01	5.23
	volume	2.4	4.5	3.3	1.6	4.3

Trend growth (1865-1913)

	value	volume		value	volume		value	volume
Portugal	2.85	2.34	Norway	2.80	2.61	Italy	2.13	1.89
Denmark	3.78	3.86	Sweden	3.50	3.35	Spain	2.55	3.28
Finland	4.12	3.84	France	1.31	1.99			

(*) goods only
Sources: Mitchell (1981). Denmark: Johansen (1985). Finland: Hjerppe (1989), Vattula (1983). Norway: Maddison (1982). Sweden: Johanson (1967). France: Lévy-Leboyer (1985), Maddison (1982). Germany: Hoffmann (1965), Lewis (1981). Italy: Ercolani (1975). U. K.: Imlah (1959), Feinstein (1972), Feinstein and Pollard (eds.) (1988), Pollard (1989, p. 4). Portugal: appendix C.

Turning now to table 3.2, we may note that the countries with a superior record to Portugal for 1865-1913 include: Denmark, Finland, Sweden and Spain. Norway's long run growth rate is similar and the record of France and Italy is inferior.[1] Export performance among countries was significantly different not only in terms of turning points in the cycles, but also in growth rates experienced within each cycle. The relatively slow growth of the volume of Portuguese exports in the initial decade (1856-1865), was specific to Portugal. Only the cycles 1865-1875 and 1895-1913 were common to all countries included in the tables, although peak years do not coincide perfectly. The Portuguese cycle 1865-1875 had its counterpart in Norway, France, Italy and Spain. But the next upswing cycle in Portugal's exports, from 1875 to 1886 was not replicated in the rest of Western Europe, except in Italy, where the peak year came in 1884. The important turning point at 1886 was specific to Portugal, and has thus to be explained endogenously in terms of the internal conditions of the country or in terms of particular markets.[2]

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1. By comparing growth rates computed between peak years, our conclusions may differ from other inter-country comparisons of export growth such as Bairoch (1973). Note that figures for Norway do not include exports of services, and thus growth is undervalued because Norwegian services exports increased steeply in this period.

2. This turning point was determined by wine exports to France. Although for different reasons, this was also the case with Italy. See Federico (1979, p. 396) and (1987, pp. 6-7).

In the 1890s most countries experienced more or less common turning points in export volumes (ranging from 1894 in Denmark, to 1899 in France). If similar turning points are indicative of market integration, then it is legitimate to conclude that it was only in this decade that the countries in our sample became integrated into an international cycle.[1]

Portugal's insertion in world markets was relatively weak as shown by a comparison of cycles in its exports and cycles in indices for economic activity in the *core* countries of international economy. Table 3.3 shows that, in disagreement to what has been said for other countries in the European periphery, the core countries did not act as a direct stimulus for the Portuguese economy, through exports.[2] Otherwise, one would expect that the cycles of Portuguese exports would match those for the core industrial production or the core economic activity. Yet, the peaks and troughs of Portuguese exports do not generally coincide with those in the core, and there were some peaks in the core economies which were not reflected in Portuguese exports, such as 1882-1883, 1890-1891 and 1906-1907.

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1. By correlating GDP deflators, McCloskey and Zecher (1981, pp. 197-98) conclude that the economies of Britain, United States, Germany, France, and Sweden were already well integrated in the period after 1880. This is of course not incompatible with our finding regarding export volumes given that terms of trade and supply elasticities for exports differ from country to country. According to Klovland (1989, pp. 34-37) Norwegian economic cycles were also similar to the European cycles.

2. See Lewis (1978, pp. 164-68), Berend and Ranky (1982, pp. 113-14). Based on the same kind of analysis, Prados (1982, pp. 34-38) gives a similar conclusion regarding Spain, as we have concluded here for Portugal.

Table 3.3
Cycles for Portugal's Exports and for the Core Economic Activity

Exports from Portugal	Core industrial production	Economic activity of			
		G. Britain	France	Germany	U.S.A.
(T:1842)					
		P:1845	P:1846		
P:1850		T:1848	T:1848		
T:1852		P:1854	P:1853	P:1852	
P:1856					
T:1858		T:1858	T:1858	T:1858	T:1858
P:1866	P:1866	P:1866	P:1867	P:1863	P:1863
T:1867	T:1871	T:1868	T:1868	T:1866	T:1867
P:1875	P:1872	P:1873	P:1873	P:1872	P:1873
T:1879	T:1877	T:1879	T:1879	T:1879	T:1879
	P:1882	P:1883	P:1882	P:1882	P:1882
P:1886	T:1885	T:1886	T:1887	T:1886	T:1885
	P:1890	P:1890	P:1891	P:1890	P:1890
T:1891	T:1894	T:1895	T:1895	T:1895	T:1894
P:1898	P:1899	P:1900	P:1900	P:1900	P:1899
	T:1900	T:1904	T:1904	T:1905	T:1904
	P:1906	P:1907	P:1907	P:1907	P:1907
T:1908	T:1908	T:1909	T:1909	T:1909	T:1909
P:1910	P:1913	P:1913	P:1912	P:1913	P:1913

Notes: Peaks (P) and Troughs (T) are estimated as deviations from trends given by linear regressions.
Sources: Lains (1986, p. 385), Lewis (1978, p. 275), and Rostow (1980, pp. 324-25).

Pereira (1983) was the first historian to point out to the difficulties for Portuguese exports by the mid-1880s. It is important to stress, however, that those difficulties arose mainly from domestic economic conditions and not as much from external markets, as she argues. It is true that since the 1870s conditions for international trade in agricultural products changed, as a consequence of increased competition from non-European agricultural exports, such as wheat from the United

States, meat from Southern America and fruit from South Africa.[1] These shifts in international trade were associated with large structural shifts in the agricultural sectors of most European countries, which are generally ambiguously defined as the "agricultural depression". The analysis given by Pereira (1983) for the decline in agricultural exports and the inferences made on Portuguese agricultural output growth have to be set in this context. It is thus important to review the evidence on the so-called agricultural depression in Europe from 1873 to 1896 and its relationship to the changing conditions in international markets stemming from the emergence of the United States as a wheat exporter.

If by depression is meant either falling relative prices, rents, total output or employment, the available empirical evidence shows clearly that agricultural depression is too strong a term to characterise European agriculture in the last quarter of the nineteenth century. This is best shown by Jensen (1937), a monograph on Danish agriculture which analysis evidence on relative price trends, a type of study difficult to find in the related literature.[2] As a matter of fact, relative prices of

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1. See for instance Stern (1958, p. 22).

2. For similar conclusions for the case of Britain, but drawn on a less detailed analysis, see Fletcher (1973). See also Kindleberger (1951) and Saul (1985, p. 34). It is interesting to note how Bairoch (1989, pp. 46-51) has attempted at reviving the "agricultural depression" in Europe: "In 1860-80, grain accounted for some 35-40% of all agricultural production in the industrialized countries of continental Europe. In such a system, the substitution of 22% of grain production by imports in the space of 26 years represents in very simple terms a decreases of 0.33% per annum in the volume

agricultural imports in Denmark declined almost as much as relative prices of industrial imports, and the cumulative difference for the period 1873 to 1896 was just about 10%. The slight increases in relative prices that occurred in same cases, namely the price of butter in respect to that of wheat, are explained by the increase of the quality of the manufactured good.[1] Furthermore, there are no clear signs of overproduction of foodstuffs in Europe or of reductions in the income elasticity of demand, which could justify a crisis in the sector. In Jensen's words:

> "It would seem that too much attention has been concentrated on the growth of the supply of agricultural products, and not enough on the demand which, as the price data seem to suggest, must have increased correspondingly."[2]

According to Jensen (1937), the "agricultural depression" in Europe was thus another facet of the general deflationary trend,

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contd.

of total agricultural production, assuming there was no exceptional increase in consumption due to availability of supplies." He then proceeds pointing out that in France per capita consumption increased by 0.27% per year (1855/64 to 1875/84), which contradicts the last assumption. However, the major problem with such conclusion is that Bairoch does not allow for substitution within agricultural output, from corn towards animal products for instance, as happened in Scandinavia and elsewhere in Europe.

1. See Jensen (1937, 193-213). For industrial goods prices, Jensen (1937, p. 198) uses the Sauerberck price index after excluding food prices. According to Jorberg and Kranz (1989, p. 1061), who also dismiss the existence of an agricultural depression, Sweden had a similar trend in its terms of trade between agriculture and industry. See also Kindleberger (1951, p. 31). For the case of France see Chevet (1989) who shows that French wheat imports and wheat prices are positively correlated, meaning that imports were determined by the level of the domestic wheat output, and not the other way round.

2. Jensen (1937, p. 207).

due to the fixed world stock of gold in a period in which the number of countries entering the gold standard, and thus the demand for gold, was increasing.[1] Agriculture suffered probably more from this deflation because it is typically less supply elastic - a farm cannot be shut or reconverted as easily as most industrial premises. Referring in particular to Denmark, Jensen (1937) concludes that wages, household expenses, upkeep of the farm and real state taxes only slightly decreased, and mortgage interest and amortization did not decrease at all, whereas farm gate prices were reduced.[2] When trends in agriculture prices are deflated by the general price trends, the period from 1873 to 1896 appears in quite a different light. Moreover, the shift in relative prices of grain and livestock, which ultimately led to more butter and less corn in Danish agricultural output, was a trend already seen in the 1850-1873 period.[3] Furthermore, it is hard to support the existence of an agricultural depression in

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1. Jensen (1937, pp. 202, 205-6). Only when new gold mines came into production in South Africa - as well as Australia and Alaska - by mid-1890s, could prices start rising again . This "global monetarist" theory has first been proposed as early as 1904 by Gustasv Casel (see Jonung, 1984, Appendix), and it is revived in Bordo and Schwartz (1981). Such a view is apparently in contradiction to the fact that interest rates decreased throughout the period - the Gibson Paradox. For this discussion see Saul (1985, pp. 16-19 and 59-61) and Harley (1977).

2. Jensen (1937, pp. 221-22).

3. Jensen (1937, pp. 209-10). Jensen (1937, pp. 221-22) also argues that the growth of United States wheat output is not particularly steep in that period, having already started in the 1850s, continuing after the turn of the century. However world wheat exports doubled between 1884/88 and 1909/13. The countries responsible for that increase were Russia, the Danube countries, Canada, Argentina, Australia and India. See Stern (1960, pp. 6, 15, 31).

this period with the evidence on trends of (labour) productivity in agriculture such as that given in the previous chapter. Agriculture lost gradually its weight in national output of most Western European countries, but productivity levels did not decrease. Thus, there is not sufficient evidence on an European agricultural depression that could justify the one that Pereira (1983) argues that happened with Portuguese agriculture.[1]

It is worth noting that agricultural exports from countries such as Denmark, in which the transformations of output structure just described took part, fared better in the international markets. These shifts may be associated with a changing structure of domestic demand, if the income elasticities of demand for meat and butter were higher than for wheat. Thus, it seems plausible to assume that the favourable shifts in export structure were related to changes in the domestic economy. The analysis of the causal relation between these two movements should take into account the timing of changes in the rhythm of export and output growth. Apparently the domestic output structure was changing already before 1873.

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1. See above the discussion on chapter 2.

3.3 - Adaptation in export trade: lessons from Scandinavia

Adaptation to new conditions in the international markets formed the basis for continued export growth by the Scandinavian countries. This section attempts to explain this process of adaptation. Some general conclusions regarding the importance of domestic factors will be drawn, laying the basis for the study of Portuguese exports. Our main purpose with such a comparison is to see to what extent the success in external markets is related to factors such as natural resource endowments or, in other words, how export specialization was formed. The Scandinavian countries exported goods with favourable international demand, whereas Portugal's main exports had a sluggish demand. But, Denmark, Norway, Sweden and Finland, managed to shift export specialisation away from sectors suffering from sluggish international demand (or strong competition from overseas) to products with expanding markets. And these shifts were achieved to a large extent within what may be defined as similar branches of production, by increasing either the quality of the products or by augmenting their industrial value added. To understand how these shifts were made possible in Scandinavia is half-way to the understanding of whey they were absent from Portugal.

Let us start by reviewing the case of Denmark. After the arrival of cheaper American wheat at the European ports in 1870s, Danish farmers increasingly shifted from grain to animal exports,

namely pork, fed with imported grains. It is most important to note, though, that this shift did not take place overnight: by 1873 the value of animal and dairy products exports already surpassed the value of grain exports by a margin of 50%.[1] These trends are of course in agreement with the finding already noted in the previous section that relative prices did not change as much as absolute prices after 1873. Pork was exported mainly to Germany and when the German government protected its home market for pork, first in 1881 and then altogether prohibiting imports of live hogs in 1887, Denmark shifted to butter exports, in the process climbing up in the chain of agricultural production.[2] Danish exports shifted not only in composition but also in distribution. By 1905/09 three quarters of Danish exports were directed to the only large free-trade country in Europe, Great Britain - a jump from 46% in 1875/79.[3] Although export growth contracted after the peak of 1880 Denmark still managed to maintain high growth rates during the period 1880-94, and higher still during 1894-1913.

A similar shift from cereal to butter exports also occurred in Finland, although to a much lesser extent than in Denmark,

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1. See Jensen (1937, pp. 59-60), Kindleberger (1951, p. 44). Bairoch (1976a, p. 264) associates the success in export markets with the earlier reconversion of Danish agriculture.

2. See Jorberg (1976, pp. 397-98).

3. See Mitchell (1981, pp. 509, 514, 535) and Bairoch (1976a, p. 264).

probably because soil conditions were not as favourable.[1] With under exploited forest resources and an agricultural population larger than elsewhere in Scandinavia, Finland found a vital source of export growth in timber products.[2] The transformation in the structure of Finnish exports was not so dramatic as in Sweden, as shown below, because capital was not abundant. Also because Finland, as part of the Russian empire, with which she had no trade barriers from 1859 to 1885, exported to a country with a less than dynamic economy. These disadvantages slowly diminished, however. By 1913 the place of Russia in Finnish trade had shrunk to 30% of total exports, compared to roughly 50% in 1860, while Britain and other countries increased in importance. The kind of exports directed towards Russia and the other destinations in Western Europe became quite different. To Russia went paper pulp. Whereas to Britain and Denmark, Finland exported timber.[3] Lower quality Finnish butter lost its Danish market by the 1880s, but then switched to the Russian market. To Russia the Finns also sold textiles and iron. Finland took advantage of belonging to the Russian Empire and continued to enjoy a special treatment in the Russian market relative to other countries, even

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1. See Jorberg (1976, p. 470). Jensen (1937, p. 24) notes that Danish territories constitute the largest area of good agricultural ground in the three Scandinavian countries, to which we may certainly add Finland.

2. According to Jorberg (1976, p. 401), there was an excess labour supply in agriculture, or "over-population", in Finland.

3. The shift from timber products to the next step in the production chain of forest products, paper pulp, only took place after the 1930s. See Hjerppe (1989, p. 161).

though in 1885 a regime of fixed quotas was imposed. Although Finnish exports remained on a level of technical sophistication below that of Denmark and Sweden, the Finish story is one of success despite the lack of capital and ready access to the European markets at the start of its long upswing.[1]

Norway too is a success story. Initial conditions again differed from other parts in Scandinavia, and again alternative solutions were explored. Although Norway traditionally exported timber and iron products, her exports became increasingly concentrated on shipping services. In spite of that, Norway took advantage of her still large forest resources, which had been long exploited, at least from the sixteenth century, meaning that forest depletion was under way and that the available timber was not as valuable because that of larger dimension, for masts and beans, had already been extracted. Although legislation for forest conservation was only applicable to state owned forests, the building first of canals and then of railways reaching the more remote forests, the increasing use of sawing machinery, conferring new uses for building material, as well as the expanding pulp and paper industry, which could also employ timber of smaller dimension, permitted a convenient exploitation of

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1. See Jorberg (1976, pp. 420, 471) and Pihkala (1964). In his provoking analysis of the Finnish case as a "subordinate nation" of the Russian Empire, Spechler (1989, pp. 8-10) does not attempt to explain why and how Finland managed to "switch" metropolis (from Russia to Sweden).

forest resources, and a correlated growth of exports.[1] Furthermore, Norwegian timber products exports were facilitated, as compared to those of the Baltic area, due to the proximity to the most important British market.

The country's other large source of export revenue was fisheries, although its importance decreased from a peak of 45% of commodity exports in 1860 to 30% in 1913.[2] Norwegian (non-forest) agriculture is generally seen as rather backward, thus unable to "act as a source of export incomes that could be used to finance investment in other sectors".[3] But Norwegian comparative advantages emerged in second-best technologies; for example in shipping services using sailing vessels or second-hand steam vessels bought from Britain. This made Norway less vulnerable to its special relationship with Sweden, and to the ending of the Customs Union with that economy which had lasted from 1873 to 1897, as part of the dual monarchy. These shifts are contemporaneous of the increase in the growth rate of exports over the 1896-1913 period.[4] Of these two activities related to the Ocean, Portugal only developed that of canned fish, and to an extent that compares well with Norway. In 1865 each country exported less than 20 tons of canned fish; by 1913 Norwegian

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1. See Hodne (1975, pp. 42-43, 57).

2. Jorberg (1976, pp. 402-3).

3. Hodne (1975, p. 139); see also Jorberg (1976, pp. 402, 426).

4. On these issues see Hodne (1975, pp. 103, 113) and Jorberg (1976, pp. 431).

exports had attained 18,000 tons, and Portuguese exports 20,000 tons.[1] The Portuguese canned fish industry was promoted by French direct investment which was faced with decreasing stocks of sardines in the French coast. The reason why a shipping industry did not develop in Portugal as it did in Norway may be related to insufficient incentive for foreign capital to invest in the sector, together with the general lack of domestic resources for investment.

In the case of Sweden, we may start by noting that the Swedish industrial share in GNP was stable throughout the decades 1860-1890 at about 15%, and increased rapidly thereafter, as opposed to what happened in Denmark, where the share of industry in GNP increased until 1890, remaining stable thereafter.[2] Moreover, in what the availability of natural resources is concerned, Sweden was clearly closer to Norway than to Denmark:

Land in use, 1901

	Arable	Permanent grass	Forest	Other and unused
Denmark	69%	6%	8%	17%
Norway	2%	1%	22%	75%
Sweden	9%	3%	52%	36%

Source: Pollard (1982, p. 234)

However, the shifts in the composition of exports mirror those described for Denmark. From the mid-1880s onwards Swedish staple

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1. See Hodne (1975, p. 76) and chapter 4.

2. See for Sweden, Jorberg (1976, p. 441), and for Denmark, Kristensen (1989, pp. 19-20).

exports of oats and forest products were replaced by meat and dairy products, mainly butter, and pulp and paper. The success in adapting to changing conditions in external markets brought about by increased competition from American wheat, Russian oats and Finnish timber, replicated the pattern of the eighteenth century. During that century, Sweden was the leading exporter of iron ore and bar iron to Britain. When iron exports were faced with increased competition from British home metals, they shifted to higher quality ores and irons.[1]

From 1851 to 1870 Swedish exports increased at high rates, close to 7% per year. By Scandinavia standards, the 1870s were years of slack export growth. According to Jorberg (1961), this was due to insufficient "production resources to satisfy a powerful increasing international demand".[2] This conclusion is drawn by comparing price fluctuations in Sweden and her main export market, Britain, as a means of grasping rigidities in Swedish supply. In the subsequent period this productive restriction was progressively overcome, and by 1913 Sweden had the more diversified export structure within the region. Cycles in export growth are not mirrored by the cycles in industrial expansion. In fact, the 1870s were years of "industrial

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1. See Jorberg (1976, p. 446) and Fridlizius (1963, p. 19). For a detailed analysis at the firm level of how the transition from oats exports to other exports in the early 1880s was carried on without major difficulties, see Fridlizius (1957, pp. 278-81).

2. Jorberg (1961, pp. 340-41).

breakthrough".[1] It is interesting to point out how Sweden managed to diversify her export basis. Soderlund (1951) gives a list of reasons which may be interesting to confront to what happened in Portugal. According to this author,

> "It was necessary to win and keep the market in hard competition with the exporters of the other countries; to obtain detailed knowledge concerning the general conditions, with which many and perhaps most of the exporters had never before had any contact; to build up a trade organisation that guaranteed an assured raw material supply at competitive prices; to finance a new industry in a country poor in capital and whose capital market was organised in an utterly primitive manner. It was also necessary to introduce technical improvements and innovations, with whose help goods could be produced which also, regarding quality, could measure up to those of competitors, and to collect and foster a skilled labour force."[2]

Following this line of argument, Fridlizius (1963), mentions that the problem of financing export industries was at least partially overcome by British importers, who provided short term loans to Swedish producers of export goods.[3] It is interesting to point out, however, that the help of British capital was important in feeding the business but not in overcoming the difficulties in starting it. In other words, only well established firms with a certain size were able to finance fully their export trade through British capital. Fridlizius (1957) calls our attention for the difficulties for a new firm to have

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1. Jorberg (1969, p. 259).

2. Quoted in Fridlizius (1963, pp. 13-15).

3. Fridlizius (1963, p. 17). The role of British merchant houses on exports of two major Swedish staples, timber and corn, is studied in Soderlund (1951) - quoted in Jorberg (1961 and 1969, pp. 267-68) and Sandberg (1978, p. 655) - and Fridlizius (1957).

its first shipments to Britain financed by the importing house: only after the firm had given proofs that it was established in the market, and had assured a regular flow of exports, did the British merchant gradually venture to satisfied the required financing. The needs for capital were "considerable", to such an extent that Swedish corn exporting firms were gradually concentrating: at the end of the period of oats export boom (1850-1880), the 3 largest firms exported 31% of total oats exports. [1]

After the early 1890s, things had changed in the Swedish economy. By then industry had already reached a "stage where its income-forming effect was so strong that fluctuations in other sectors of the economy, and even in respect of exports, were no longer so important."[2] Despite that, exports of engineering products to the other Scandinavian countries, Germany, Britain, and later to Russia, increased considerably.[3] The investment effort of the first phases was not different from that of the second phase, in spite of different industrial structures. Although the Swedish rate of investment increased significantly in the 1890s, peaking in 1901/05 at 12.5%, this last level was only slightly higher than the level in 1871/75 (11.3%).[4] In

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1. Fridlizius (1957, pp. 143, 224-31).

2. Jorberg (1961, p. 363).

3. See Kuuse (1977).

4. Johansson (1967, pp. 154-55).

conclusion, during the period of slower industrial growth, there was already enough capital to finance the new export industries, part of it of foreign origin.[1] The positive factors pointed out in the citation from Soderlund above were not working on their own.

The diversity of experiences with exports between Scandinavian countries shows that there was no single path to consistently high rates of growth, and a variety of obstacles and difficulties were surmounted. For example, when natural resources became relatively less abundant (as in Denmark and Norway) exports became less resource dependent. In Norway, where funds for investment were constrained by a backward agrarian economy, exports shifted to less capital intensive sectors and commodities. Similarly, in the two countries where natural resources were more abundant, Finland and Sweden, export specialisation differed on account of different availability of investment capital. It should be added that the process of adaptation was not peculiar to Scandinavia. In the particular case of world food exports, according to Stern (1960), "no single country has consistently maintained its relative and absolute position as a food exporter during the entire century."[2]

It may be useful to understand why Scandinavian countries managed to exploit the changing opportunities in international

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1. See Karlstrom (1985, fig. 2.3).

2. Stern (1960, p. 55).

markets, while Portugal lagged behind. Perhaps investment conditions, even in the relatively poorer Scandinavian countries, were better than in Portugal. Yet, in the second half of the nineteenth century lack of readily available domestic capital could be substituted by imports of foreign capital. In fact all the Scandinavian countries were large capital importers which was mostly directed towards financing investments in social overhead capital that benefited export trade that is, railways from the producing areas to ports of shipment, as well as ports. But Portugal also attracted foreign capital for its railways which helped in promoting exports.[1] It seems clear that those capital imports were not sufficient to substitute domestic investment, either because investment conditions were not sufficiently attractive, or because the needs were too large to be met, or because the period was not long enough to allow for the needed transformations. In any case it is not clear that foreign and domestic capital have to be substitutes. In some instances they may be complementary, if nothing else because they react to the same market signals.

One important aspect that stems from this section is that the flexibility shown by the Scandinavian countries in adapting to changes in international demand was a process already rooted in the past, developing before 1870 or even 1850.[2] Danish exports

1. See Alegria (1988, pp. 770).

2. See Milward and Saul (1973).

of dairy products did not start overnight: by 1870 Danish exports of animal and dairy products already surpassed grain exports by a 50% margin, as noted above. Norwegian exports of wood and derivates products was based on a traditional exploitation of forest resources, which were historically protected from depletion, at least in the State owned forests. Swedish export growth was backed by an economy where the rate of investment was significantly high since the earlier decades of the period here studied. Related to this, we have to note that one of the few success stories of Portuguese exports in the second half of the nineteenth century, port wine, had a gestation period of more than one century, rooted in the late seventeenth century.

As Berend and Ránky (1982) also point out, natural resources and other geographic factors, do not suffice to explain the flexibility to adapt to the "stimulus" from the centre countries. In their own words:

> Above and beyond this (...) we find the other domestic factors determining the possibility, degree, and kind of the response to the external stimuli: the level of development or degree of backwardness of the economy; the country's social structure, educational system, ideology and value system; its international political status; and the government policy directing the independent state."[1]

The authors proceed their conclusions by choosing one of these factors as the most important:

> "There can be no doubt that it is in government policy that we must seek the clue to a country's ability to react to the

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1. Berend and Ránky (1982, p. 139).

challenge of the industrialized West."[1]

Such a conclusion, however, may only displace the argument. If government policy marked in fact the difference between the Scandinavian countries and Portugal, for instance, we cannot exclude *a priori* the hypothesis that that was so because overall economic conditions were more favourable to host the apparently more sound economic policies. Taking into account that possibility, the conclusions from the analysis of commercial negotiations, for instance, may appear in quite a different light: after all the success of such negotiations could depend on the capacity of the country to provide goods to export. In the end, it may be the case that the most important element in explaining the lack of "response" is in fact the "level of development or degree of backwardness" of the country.

3.4 - Export structure and the market: cork and wines

Portuguese exports were sold in very large proportion to one market, the United Kingdom, and were concentrated upon one product, wine. The historiography on the Portuguese economy of the period associates sluggish national income growth with export

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1. Berend and Ránky (1982, p. 141).

specialization. But the experience of the Scandinavian countries throws some doubt on this line of interpretation. For example, the increasing importance of the British markets as an outlet for Danish exports is not associated with stagnation either for exports or in the rest of the economy. And the concentration of exports was even higher in Denmark and Sweden, where by the 1900s the share of the three major export items amounted, respectively, to 73% and 62% of total exports, whereas in Portugal the equivalent share was 50%.[1]

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1. Lains (1986, p. 393). Throughout his book Sideri (1970) provides information regarding the structure of Portuguese foreign trade. His analysis has some affinities with that of Pereira's (1983) and its purpose is to "demonstrate that Portugal's specialization in wine (sic) did not enhance her development and resulted in the corner stone of that country's dependence on England." (Sideri, 1970, p. 12).

Table 3.4

Composition of Exports (%)

	1840/49	1850/59	1860/69	1870/79	1880/89	1890/99	1900/09	1905/14
Wax	1.3	1.9	3.9	3.1	0.6	0.3	0.4	0.4
Hides and skins	0.3	0.2	0.5	0.6	0.7	0.8	0.9	0.9
Wool	1.4	1.6	2.1	1.4	0.9	0.7	0.5	0.4
Cork	2.1	2.5	3.6	4.4	8.9	9.3	8.8	9.4
Wood	-	-	0.5	0.7	0.5	0.4	3.6	2.6
Minerals	-	-	7.1	7.8	5.4	5.3	3.9	3.4
Raw materials	5.1	6.2	17.7	18.1	17.0	16.9	18.1	17.1
Cattle	0.4	1.3	4.1	7.1	5.2	1.7	1.8	1.6
Other live animals	0.0	0.0	1.4	1.6	2.2	5.6(*)	11.2(*)	9.0(*)
Fresh and salted fish	0.7	0.7	0.8	1.3	1.2	1.3	1.4	1.9
Fruits and vegetables	8.3	7.9	8.8	9.3	6.7	7.8	8.0	7.2
Grains	1.0	1.2	1.0	0.3	0.0	0.2	0.1	0.1
Salt	2.3	2.7	1.8	1.5	1.0	0.6	0.4	0.3
Foodstuffs	12.7	13.8	17.9	21.1	16.3	17.2	22.9	20.1
Canned fish	-	-	-	0.1	2.1	4.3	5.5	6.4
Flour	0.8	0.8	0.3	0.1	0.2	0.5	0.8	1.0
Olive oil	2.8	5.1	4.3	2.5	0.7	1.2	1.8	1.8
Port wine	37.7	37.7	37.1	35.3	26.6	24.4	17.7	17.8
Madeira wine	7.1	3.7	1.3	2.1	2.6	2.8	2.3	1.9
Common wine	6.6	10.5	6.5	7.9	22.8	16.4	13.5	14.7
Processed foodstuffs	54.2	57.8	49.5	48.0	55.0	50.1	41.6	43.6
Cottons	11.2(#)	5.0(#)	2.2	1.4	0.4	4.0	4.8	4.2
Other textiles	2.0	1.1	0.5	0.4	0.3	0.4	0.2	0.1
Footwear	0.1	0.2	0.6	0.9	0.7	0.3	0.4	0.3
Cork manufactures	0.1	0.1	0.3	0.8	2.2	2.8	3.0	3.0
Iron manufactures	0.8	0.7	0.5	0.6	0.4	0.5	0.4	0.4
Manufactures	14.2	7.1	4.1	4.1	4.0	8.0	8.8	8.0
Other	13.8	15.1	10.8	8.7	7.7	7.8	8.6	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(*) Includes live animals transit to Spain from 1890/99.

(#) Includes smuggling of British cottons to Spain in 1840/49 and 1850/59.

Until 1865 there is data for the years: 1842, 1843, 1848, 1851, 1855, 1856, and 1861

Sources: Computed from appendix C.

Table 3.5
Distribution of Exports (%)

	1840/49	1850/59	1860/69	1870/79	1880/89	1890/99	1900/09	1905/14
United Kingdom	48.4	49.2	58.2	55.9	35.7	29.8	25.6	23.1
Spain	17.1	9.1	8.4	7.3	5.8	9.7	16.1	16.1
France	1.0	1.5	3.1	3.6	20.4	3.7	2.7	3.1
Italy (*)	1.2	0.8	1.3	0.8	0.8	0.9	1.3	1.6
Germany (*)	2.5	3.1	1.2	2.4	5.5	8.3	7.6	8.6
Belgium	0.4	0.7	0.7	1.0	1.4	2.6	2.9	3.1
The Netherlands	2.0	0.9	1.2	1.2	0.8	1.6	1.5	1.7
Sweden and Norway	1.0	1.1	1.0	0.9	1.1	1.3	1.4	1.2
Russia	3.3	1.3	1.6	1.5	1.6	2.4	2.7	2.6
U.S.A.	2.3	3.7	0.9	1.5	2.7	2.5	2.1	2.5
Brazil	19.1	24.7	18.6	19.5	19.7	24.3	17.6	18.2
African colonies	1.0	2.4	3.1	3.7	2.9	10.8	15.3	15.1
Other	0.7	1.5	0.7	0.7	1.6	2.1	2.5	3.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(*) Borders as in 1871.
Source: Computed from appendix C.

In any case, the 1880s witnessed some degree of product and market diversification of Portugal's exports. Market diversification was achieved by increasing sales to Germany and the United States. This is a normal trend, as these two powers were getting an increasing importance in world trade. Portugal also exported a larger proportion of its exports outside Europe, namely Brazil and the African colonies, than any other country in Western Europe, except the United Kingdom. The relative importance of South America for Portugal is comparable only to Spain. The relative importance of Africa is the largest within Europe, followed at some distance by France.

Table 3.6
European Exports by Main Areas, 1913
(% of total exports)

	Destination					
Origin	Europe	N.America	S.America	Asia	Africa	Oceania
PORTUGAL	59.8	3.0	18.7	2.2	16.3	0.0
Denmark	97.6	1.4	0.4	0.3	0.2	0.1
Finland	98.0	0.0	0.1	0.0	2.0	0.0
Norway	80.8	8.5	4.3	1.9	1.4	3.0
Sweden	86.9	5.2	1.3	2.6	2.7	1.0
France	69.8	7.4	6.9	3.5	12.3	0.1
Italy	65.8	13.3	11.6	4.4	4.3	0.4
Spain	70.6	6.5	18.2	1.4	3.2	0.1
U.K.	35.2	11.6	12.6	24.5	7.4	8.6

Source: Bairoch (1974, p. 573).

The importance of Brazil as an outlet for Portugal's exports shows little change since the 1840s, while the significance of the African colonies, jumped in the 1890s, as a direct consequence of the new colonial tariff schedule of 1892, which guaranteed the markets on the west coast, namely, S. Tomé e Príncipe, Cabo Verde and Angola, to Portuguese cottons and wines. The export of cotton goods to the colonies went up by a factor of 5.3 between 1891 and 1910, reaching 51% of total exports to the area. African markets accounted for almost all of the increase in the weight of cotton goods within total exports after 1890/99. Yet it must be noted that cotton goods exports were but a small portion of total exports (peaking at just 5% in the early 1900s). Thus too great importance has been attributed to these exports. Pereira's (1983) statement that they "saved the country from the

near total collapse between 1889 and 1900." is exaggerated because they accounted for such small percentage of national output (about 10%), and had a high import content that is, a low domestic value added.[1] These exports of cotton goods were little else than cloth imported from Britain, dyed, packed, and shipped to the presumably very poor native African population.[2] Sales to the colonies were very sensitive to the revenues it could earn through their exports. By the turn of the century, Angola, the main market in Africa, cut its imports because of the fall of its own exports of wild rubber, due to a decrease in the international prices and the exhaustion of the available rubber reserves.[3] All in all, the cotton export boom lasted only from 1892 till 1900.

Another facet of the changing structure of exports is some diversification towards northern European countries, such as Germany and Belgium, and a slight increase of the importance of

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1. Pereira (1983, pp. 320-21). Although Cabral (1979, pp. 148-49) links an expansion of the cotton goods industry to the colonial markets, he notes that exports to Africa accounted but for around 10-15% of cottons' total domestic output.

2. Vieira (1905, p. 465), a firm believer of Portugal's good agricultural potential, after recalling that most of inputs for the cotton industry had to be imported, including cloth, writes: "havemos de concordar que só por um esforço de boa vontade podemos dar a esta pequena operação de estamparia foros de uma indústria". According to Castro (1978, p. 77), 95% of total consumption of cotton piece goods was bought from Britain.

3. See Clarence-Smith (1985, pp. 91-92). It is interesting to point out that the wild rubber extraction and export was an activity which was in the hands of native Africans, and did not depend on Metropolitan investments. See Heywood (1987, pp. 356-58). For an outlook of wine exports to Africa see Capela (1973) and Clarence-Smith (1985, pp. 92-94).

the Scandinavian countries and the United States. This market diversification was associated with a product diversification towards raw and manufactured cork, and canned fish. The growth of these two export industries was largely dependent on foreign investment, namely from Britain and Spain (Catalonia) in the case of cork stoppers, and France in the case of canned fish.[1] But it is important to note that the change in the structure of Portuguese exports (in contrast to Scandinavia), was associated with a decline in the trend rate of growth. In fact, the earlier period, dominated by wine exports to Britain and later to France, witnessed far greater rates of export growth. Diversification was nowhere near enough to compensate for the near stagnation of wine exports after 1886. We have shown in the previous section that Scandinavian exports were to a large extent based on the natural resources of those countries. Let us now try to ascertain if exports from Portugal were somehow hindered by lack of resources which could provide for a basis to produce goods that could be sold abroad. For that purpose we shall be looking at a particular branch of Portuguese exports, cork stoppers.[2]

Manufactured cork exports increased considerably over the entire period and by 1910/13 corks for bottles accounted for 23% of the total value of cork exports. Apparently, there were no

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1. See Cabral (1979, pp. 344-45).

2. Portuguese cork exports are studied by Pereira (1983, pp. 234-37) and Miranda (1991, cap. V).

supply constraints upon any increase in the exports of manufactured cork. Furthermore, the large difference in the export prices of raw cork compared to manufactured cork depict the existence of a considerable potential for adding value to the raw material. For example, if 75% of Portuguese cork had been exported in the form of manufactures, instead of roughly 25% (at the same price), the value of cork exports, raw and manufactured, could have more than doubled, and the value of total exports from Portugal would have risen by 14%, over the years 1905/09. It should be noted that Spain exported as much as 95% of its cork in manufactures. One possible explanation for the relatively low share of Portugal's cork manufactures exports is that they were sold at less competitive prices than Spain's. But this does not seem to be the case, at least in the British market. As a matter of fact, the price of Portuguese cork stoppers imported into Britain was even slightly lower than the average price of imports.[1]

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1. This is inferred from the fact that the value market share was slightly lower than the volume market share of Portuguese corks in Britain, 45% vs. 48% (average for 1902/06 and 1909). See Cabreira (1914, pp. 7-9). It may be noted that cork manufactures from Portugal were considered of high quality, due to the specially favourable natural conditions for cork trees. See Costa (1908, pp. 231-32).

Table 3.7

Cork Exports: Portugal and Spain

	Portugal				Spain	
	Total		Manufactured		Total	Manufac.
	Value (contos)	Volume (tons)	Value (%)	Volume (%)	Value (contos)	Value (%)
1855/64	432		(6.1)	(4.0)	1119	89.1
1865/69	617	11255	6.7	3.4	1540	94.5
1870/74	1144	15779	11.7	5.4	2191	93.8
1875/79	1476	14301	19.2	8.7	1993	89.4
1880/84	2683	21514	17.1	6.7	2399	90.3
1885/89	3608	23884	22.3	7.1	3315	93.7
1890/94	4723	25102	24.1	9.1	4376	94.3
1895/99	6409	31059	22.6	9.4	6332	86.9
1900/04	6046	33427	25.7	10.6	6964	94.4
1905/09	5592	39493	25.7	10.1	7034	94.8
1910/13	7773	48978	22.8	8.2	9311	93.6

Notes: Portuguese exports by value corrected according to appendix B; Spanish exports were converted at market exchange rates.
Sources: appendix C; and Carreras (1989, pp. 113-14); see also table in Zapata (1986, p. 253).

Britain was the only market where Portugal had a large share, close to one half by 1900. Interestingly enough, it was also the only market which did not impose tariffs on the product, following its general free-trade regime. In Germany and the United States, things were rather different for Portuguese corks. In 1908/10 Spain provided 86% of the total value of US imports of the product, whereas Portuguese cork stoppers accounted for just 4% of that market. Portuguese exports also accounted for only 15% of the volume of cork manufactures imported into Germany. According to Cabreira (1914), Portugal had potential markets not

only here, as well as in France, Scandinavia, and even Argentina, Australia and Japan, but the difficulties in expanding markets were immense because most countries were protecting their native industries. However, the market was there: Spain exported to the protectionist United States as many cork stoppers (by volume) as Portugal exported to free-trade Britain.[1]

To overcome difficult international conditions, it was several times proposed in Portugal that raw cork exports be prohibited. Cabreira (1914), who did not believe in the effectiveness of such a measure, hypothesised that this would at least have attracted foreign investors. But, unless there was a true monopoly from the producing countries around the Mediterranean basin, the measure would have been ineffective: alternative sources could still be sought. France and Spain were not interested in forbidding their exports of the raw material, though, because their industries were competitive enough. In his small pamphlet, Cabreira (1914) summarizes a series of alternative measures that he thinks could have led to a change in Portuguese international competitiveness: export incentives and tariff reductions for machinery; organization of commercial credit to the industry; constitution of a commission of producers to "study and conquer the foreign markets", with the help of the consular services and private delegates; cooperation between producers for working in a "modern fashion"; negotiation of

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1. See Cabreira (1914, p. 9).

commercial treaties; as well as prizes for exporters of cork stoppers.[1] Such a list shows how wide and general the problem was: organization, modernization and easy credit seem to be the key words, together with commercial treaties. To these we now turn.[2]

After 1892, when most commercial treaties within Europe were to end, and a new net of agreements would have to be negotiated, increasingly on a bilateral basis, Portugal clearly lost its grip. Three decades before, that is after the 1860 Anglo-French treaty, Portugal had managed to keep with the system. From February 1892 Germany increased its general tariff on cork manufactures from 10 to 30 marks per 100 kilograms. As opposed Contrarily to Portugal, Spain managed to prorogue her previous treaty with Germany by a *modus vivendi*, keeping the old tariff. By July 1896 Spain and Germany signed a new treaty, after four years of difficult negotiations. Portugal was left out. Quoting from a Frankfurt newspaper, Portugal's special envoy to the Berlin court, Viscount of Pindella, called the attention of Hintze Ribeiro, the minister of foreign affairs, to the possibility of Portugal taking advantage of the tariff war that went on between Spain and Germany in 1892-1896. By signing a

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1. Cabreira (1914, pp. 15-16).

2. In respect to organisation problems of producers, it is interesting to point out that the Scandinavian paper pulp producers and exporters only reached some kind of cooperation as late as 1891, by founding of the *Scandinavian Paper Pulp Association*, after and not before the export business was well on its feet (Hodne, 1975, p. 58).

treaty with Portugal, "Germany (...) could stop the consequences of the tariff war with Spain, and at the same time make pressure on Spanish policy". According to the same source, the treaty was not signed because the Portuguese government was unwilling to give concessions on the new 1892 tariff schedule, and imposed too many difficulties.[1] However, after Germany had signed the treaty with Spain, her interest in Portugal clearly diminished. The Portuguese government made an attempt to revive the negotiations from December 1900 till March 1901, but now the answer from the German government was that it was necessary to wait for the full revision of the Caprivi treaty system which was to end in January 1903.[2]

In 1905, the same Viscount of Pindella was still alerting Portugal's minister of foreign affairs to the dangers of the "commercial isolation" from Germany. Following three years of negotiations, Germany was going to sign new treaties with Austria-Hungary, Belgium, Italy, Rumania, Russia, Serbia, Switzerland, and confirm old commercial agreements with France, Bulgaria, Turkey, Greece, Holland and Spain. Only in 1908 did Portugal finally signed a treaty with Germany, which meant that for sixteen years Portuguese products did not have the most favoured nation treatment, and had to pay duties in Germany

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1. Negócios Externos (1909, I, 41-42).

2. Negócios Externos (1909, I, Appendix II).

according to the higher general tariff.[1]

Why did it take so long to reach an agreement? It is hard to formulate a clear answer to this question from the diplomatic correspondence. That correspondence shows, however, that at several points in time the interest on the agreement was larger in Germany than in Portugal. Moreover, the only product with which the Portuguese government seemed really concerned was wine, more precisely the more heavy Port and Madeira wines. In 1905 the then minister of foreign affairs, António Eduardo Villaça, instructed the Portuguese envoy to Berlin to follow the treaty negotiations that were going on between Germany and the rest of Europe, but advised him that

> "the limited number of products exported by Portugal, as well as their peculiar origin and specificity, or their price competitiveness, or even their quality and acceptability are, however, *circumstances that render less indispensable the entrance of Portugal in that concert.*"[2]

Portugal was unwilling to give too many concessions to sign a treaty with Germany. Were Portuguese officials bending to pressure groups from industrial interests, or were they really aware that the ability to increase exports was not large enough to justify taking risks?

The difference in the size of the manufactured cork industries of Portugal and Spain was enormous already by mid-century, when Spanish output of cork stoppers was 38 times that

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1. Negócios Externos (1909, II, 11) and (1909, II, 44).

2. Negócios Externos (1909, II, 4) (my italics).

of Portugal. The beginning of the cork industry in Spain can be traced back to the end of the eighteenth century, when Catalonia started producing cork stoppers for the French market. By the 1830s, Catalonian producers, faced with a scarcity of the raw material, descended to Andalucia and Extremadura for new sources of raw cork, and then to Portugal. From this early period Portugal was exporting raw cork to Spain, and was a relatively modest producer of manufactured cork.[1] By 1910/13 Portugal exported the equivalent of 20% of Spanish cork manufactures, implying an increase in output of 67 times in the case of Portugal and slightly less than 9 times in Spain, between the 1850s and the 1910s.[2] Increasing further exports of cork manufactures to the Spanish relative level would have required large amounts of capital investment, and considerable gains in world market shares. This conclusion may help answer the question put at the end of the previous paragraph.

The lack of trade agreements with major importers as Germany or France, certainly hindered exports of cork stoppers. However, it also has to be taken into account that the possibility that the increase of domestic supply was constrained by the availability to invest in the sector. This constraint could be

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1. For the Spanish cork industry see Zapata (1986, p. 254). See also Fonseca (1992, p. 60) and Matos (1991, pp. 570-73). For a different view, according to which the Portuguese cork industry was not an offspring of the Spanish industry, see Miranda (1991, p. 79).

2. It is assumed that in both countries output was totally exported. See references in the previous note.

partially surpassed by foreign investment. That was precisely what happened: since the early days of the industry, British capitalists invested in the Portuguese cork industry, controlling the sector until the 1890s.[1] It may be assumed that British producers in Portugal at least were not too concerned in lobbying for better treatment in the German and French markets, given that they could sell to free-trade Britain. This hints to the conclusion that tariffs were not negotiated because the capacity to increase exports to Germany and France was limited, and not the other way round.

We now turn to the analysis of wine exports, which dominated Portuguese exports to a degree experienced by no other wine producing country. The overall importance of the three types of wine that Portugal exported (port, madeira and common wines) decreased, though, from more than 50% of total exports in the 1850s, to roughly 35% in 1910/13, with a peak in the 1880s (see table 3.4). This "blip" in the 1880s was due to the large increase of exports to France, whose vineyards had been severely affected by the phylloxera. The main market for port wine was Britain, which by 1850/54 imported 75% of the export volume. This proportion decreased to 58% by 1910/14. The second best market for this particular type of wine was Brazil, to where exports peaked at 40% of total volume in the years 1880/86. Brazilian imports accounted for most of the fluctuations in port wine

1. Fonseca (1992, p. 76). See also Miranda (1991, p. 80).

exports; Britain was a more stable market. By 1910/14 the market had been somehow diversified towards Northern Europe, in particular to Scandinavia and Germany, which purchased 27% of total port wine exports (by volume).[1] Exports of common wine were marked by the enormous increase in exports to France in the 1880s. Until then the main markets were Britain and Brazil. After the boom of exports to France, total common wine exports did not fell back and eventually increased after 1900/04, while exports to France fell back to their earlier level. This was due to the favourable trend of exports to Brazil and to the Portuguese African colonies, the latter protected after 1892.[2]

To what extent did these shifts between markets imply an optimal exploitation of the conditions offered by the external markets, in particular European markets? Again a comparison with Spain shows that Portuguese exports lost momentum. And again there are grounds to presume that this was at least in part due to supply constraints. Furthermore, a comparison with the Italian experience as a wine exporter, shows that the conditions for Portugal were also adverse in terms of its bargaining position in the international markets. First of all, Portuguese wine exports did not respond fully to the increase in French demand, so that by 1888 the share by volume of Portugal's wine in the French

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1. See Pereira (1983, pp. 217-32), Martins (1990, pp. 248-51), and Miranda (1991, cap. IV).

2. Martins (1990, pp. 252-53).

market was 8%, down from 15% in 1876. After 1889 wine sales to France were reduced not only because of the recovery in the vineyards which had been affected by the phylloxera, but also because of the increase of Algerian wine production sent to France. The boom in foreign (not colonial) wine imports into France was short lived.[1]

Meanwhile, the share of Portuguese wines sold on the British market decreased successively from 37% of total volume imports, to 21% in 1891/96.[2] The main reason for this declining trend was a shift in taste in Britain from the consumption of more alcoholic to less alcoholic wines. The structure of the British tariff schedule did not help either. In fact, wine was one of the few items (which amounted to just four after 1854) taxed by customs in Britain. These were mainly fiscal taxes and the wine tariff was considered as a particular case of a tax on alcohol. As such, Britain introduced in 1860 tariff differentials imposing higher tariffs on heavier wines, port and sherry, discriminating in favour of the lighter wines from France. In the abundant consular correspondence between Lisbon and London on this subject, the British Government defended this discrimination on the account that it was a tax on the alcoholic content of the wine. Diplomatically it was however important to improve relations with France, and the 1860 Cobden-Chevalier treaty led

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1. Lains (1986, p. 401). For data on wine imports into France and from Algeria see Lachiver (1988, pp. 442-44, 447-48).

2. This share had peaked at 50% in 1811/20 (see Sideri, 1970, p. 336).

to positive discrimination in favour of French wines, which happened to have lower alcoholic content, compared to those of Portugal (and Spain).[1]

Wine duties in Britain were successively reduced in 1876 and 1886. Nevertheless Portuguese wines were still "too alcoholic" to benefit from these reductions.[2] So the market for port wine in Britain became constrained. That was not the case for common wines, but Portuguese exporters did not take the same advantage of access to Britain as Spanish exporters. In 1876 96% of Spanish wines exported to Britain fell within the higher duty scale. Twenty-two years later this proportion had fallen to 25%. Spanish ordinary wine exports increased from practically nil (0.3 m gallons) to 3.3 m gallons. The comparable trend for Portugal was: 96% of heavy wines in 1876 and 94% in 1898, and it is thus not surprising that Portuguese wine exports to Britain hardly increased in the period (from 0.2 to 0.3 m gallons).[3]

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1. See Parliamentary Papers (1872), (1874) and (1876), and Negócios Externos (1872) and (1882). On the analysis of this negotiations regarding Spain, see Saul (1960, pp. 135-41).

2. The minimum tariff rate in Britain applied to the wines with less then 26 degrees in the Sykes scale, which is equivalent to 17.1 degrees in the scale used in Spain and Portugal: , whereas the official minimum alcoholic content of port wine was reduced to 16.5 degrees only in 1907, and still today it is hard to find a good Port with less then 18 degrees. See Simpson (1985, p. 173) and Martins (1990, p. 116). In the 1870s things were not much different: the alcoholic content for common wines was as high as between 14 and 16 degrees, whereas in the Vila Real district (a major producer of port wine) it reached 19 degrees (Figueiredo, 1873, pp. 269-70).

3. See Lains (1986, p. 403).

U.K. Wine Imports UK according to Alcoholic Content (%)

Year	Portugal			Spain			France		
	< 26	26-30	> 30	< 26	26-30	> 30	< 26	26-30	> 30
1876	1.6	2.7	95.7	3.2	1.6	95.7	96.3	2.9	0.8
1887	1.2	4.5	94.3	15.5	34.8	49.7	99.1	0.4	0.5
1898	0.8	5.2	94.0	16.9	58.3	24.8	99.4	0.4	0.2

Note: The intervals are defined according to the Sykes alcoholic scale.
Sources: Parliamentary Papers (1878-79, pp. 636-37), (1888, pp. 612-13) and (1899,pp. 754-55).

The large increase of Spanish exports of lighter wines was permitted by the signature of a treaty with Great Britain in 1886 that reduced the scale in favour of Spanish wines.[1] However, the fact is that Spain produced such wines and Portugal did not: in 1886 Portugal already had back from Britain the most favoured nation treatment, and as such it was not barred from exporting the same kind of wines, if only they were produced at competitive prices. There was a potential demand for light wines in Great Britain and Continental Europe that Portugal did not manage to exploit by switching to exports of lighter wines. The solution to overcame this problem was evident to everybody, including to the British consular service. According to the commercial *attaché* at the legation in Lisbon:

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1. See Nadal (1978, p. 60). This treaty, which lasted until 1892, increased the minimum alcoholic content to 30 degrees for the lower duty rate. From 1882 Spain also benefited from special treatment in France (Carnero, 1986, p. 292).

> "To place a new class of wine on the market requires considerable enterprise, and might be undertaken by well-known firms who can supply their regular customers with samples for trial. If this were done, and the prejudice against unknown articles of consumption were overcome, there can be no doubt that these light wines would have a ready sale in England."[1]

We have concluded from the example of the Scandinavian countries that these kind of solutions involved considerable investments and a productive capacity able to feed trade flows regularly. Can we try to ascertain if this loss of potential foreign markets was due to an entrepreneurial failure among growers and exporters, or constraints on productive capacity?

Even if the Portuguese response to increases in international demand was not fully satisfactory, there were two instances in which wine exports were rather responsive. Firstly, in spite of the wine disease that affected the Douro port wine production area in 1867/68, wine producers of the region, taking advantage of the freedom to export all kinds of wines from Oporto granted in 1865, managed to keep their exports up by mixing the genuine port wines with wines from the Southern regions of Portugal, not yet affected by the phylloxera.[2] The mixture of wines led to a decline in quality. Nevertheless, despite the

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1. Diplomatic and Consular Reports [...] (1902, p. 7).

2. Pereira (1983, p, 225). The phyloxera was first detected in the Douro region in 1867 and not in 1872, as Pereira (1983, p. 127) mentions. The latter date was when the disease was first recognized by the authorities. See Martins (1990, p. 345) and (1991, p. 655). Surprisingly enough, phyloxera reached Spanish vineyards only afterwards, in 1878-1879, first in the province of Malaga and then in Gerona (Nadal, 1978, p. 61); in France, phyloxera was first detected in 1863 (Lachiver, 1988, p. 412).

complaints from British importers, exports were not affected either in terms of volume or in terms of price, which declined only after 1870, following a general fall in international prices.[1] The maintenance of export levels has to be contrasted with the drastic decrease of port wine production. According to official estimates, in 1880 output had decreased by 240,000 hectolitres, and a further decrease of 536,000 hectolitres was registered in 1888.[2] Exports went through the phylloxera crisis without drastic decline: by 1880 the export peak of 1875/77 had already been reached, and they increased further till 1886. Brazil accounted for most of this increase, which may reflect the decrease in quality of port wines after the phylloxera.

But the increase in wine exports could not depend on port wine, given that its strong alcoholic content pleased neither the British consumer nor the custom officer. Furthermore in 1892 the Méline tariff was implemented which also discriminated against heavier wines; and from 1906 Germany discriminated positively the Italian Marsala wine a strong competitor for port and Madeira wines.[3] The alternative would have been to export more common wine. Again a comparison with Spain shows that the

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1. See Martins (1990, 244).

2. See Pereira (1983, p. 130). Although it is not mentioned, it is probable that these losses are cumulative given that the levels of production before the phyloxera - more precisely in 1860/64 last period for which we have information - was just 228,000 hl. See Martins (1990, p. 229). In any case the figures in the text point to a drastic fall in output.

3. For France see Smith (1980, Appendix 2), and for Germany see Negócios Externos (1909, II, 44).

market was there, but that Portuguese producers either did not or could not take full advantage of the growing demand. Portuguese common wines were known to be too strong, almost as strong as port wine. For the boom in the French market this happened to be an advantage because France imported wine to distil and mix with her own wines. Nevertheless, Spanish exports increased in absolute terms considerably more than exports from Portugal. Besides, the boom period in Spain lasted at least fifteen years from 1880, whereas in Portugal it lasted for just five years (1880/84).[1]

But we must distinguish between the productive capacities of the two countries to see to what extent their export effort can be compared. Although for the period 1880/84 the export effort of Portugal was relatively high, in that 40% of total output was exported, in the following period this proportion was reduced to levels below those of Spain.[2] Thus, it appears that there was in Portugal a sufficiently large productive basis for augmenting wine exports. And international demand was there. If the proportion of exports to output in Portugal had been similar to that of Spain in say 1895/99, wine exports by volume would have increased by 65%, that is by 516,000 hl, which only represent

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1. For Spain see Prados (1982, p. 44).

2. The export effort of port wine was of course much larger. According to the available figures gathered by Martins (1990, p. 229), the share of exports in port wine output was 79% in 1860/64 and 105% in 1909/13 (showing some stock depletion).

circa 9% of total wine exported from Spain in the same years. If higher shares of the total domestic output of wine were not sold abroad, it was because of the intrinsic quality of the common wines. Thus to increase exports the structure of the domestic output would have to change. Once again, the example of the Scandinavian countries given in the previous section points out to the hypothesis that changes in production would have to have occurred before changes in exports.

Table 3.8

Wine Exports: Portugal, Spain and Italy (000 hl)

	Portugal			Spain			Italy
	Common	Other(1)	Total	Common	Other(2)	Total	Total
1855/64							294
1865/69	96	207	303	1048	319	1368	292
1870/74	144	266	410	1485	401	1886	335
1875/79	183	308	490	2200	275	2475	569
1880/84	411	341	752	6610	268	6878	2062
1885/89	1285	342	1627	7794	235	8029	2141
1890/94	508	316	825	7563	187	7750	1774
1895/99	474	310	784	5622	99	5722	2139
1900/04	510	284	794	2466	113	2575	1585
1905/09	615	267	882	1353	214	1567	1159
1910/13	822	315	1137	3081	158	3239	1235

(1) Port and Madeira wines; (2) Sherry; (3) 1861/1864
Sources: appendix C; Carreras (1989, pp. 113-14) and Coppa (1970, pp. 755, 764).

Table 3.9

Wine Output and Export Shares: Portugal, Spain and Italy
(000 hl)

	Portugal		Spain		Italy(a)	
	Output	Ex/Out	Output	Ex/Out	Output	Ex/Out
1855/64						
1865/69	1678	0.18			23533	0.012
1870/74	2199	0.19				
1875/79	2274	0.22			26934	0.024
1880/84	2528	0.30				
1885/89	3707	0.40	26092	0.32	31273	0.063
1890/94	3400	0.24	24394	0.32		
1895/99	4300	0.18	18808	0.30	31959	0.064
1900/04	5225	0.15	18772	0.14		
1905/09	4692	0.19	16587	0.09	44123	0.044
1910/13	4008	0.28	14900	0.22		

(a) Decennial averages starting in 1861.
Sources: appendixes A and C; Carreras (1989, pp. 107-8); and Coppa (1970, p. 765).

Apart from the incapacity to switch to less alcoholic wine exports, the relative failure of Portuguese wines in keeping at pace with the markets is certainly also due, at least in part, to the failure to maintain trade agreements with its major partners, specially after 1892. The commercial treaties between Portugal and France successively signed in 1866 and 1882, were not reconfirmed by France during the French tariff reforms of 1890-91. In 1892 France applied to Portuguese wines the general tariff, whereas Spain was exporting wines to France at the lower minimum tariff.[1] According to Cordeiro (1896), the situation in

1. See Smith (1980, pp. 204-10) and Martins (1990, p. 116).

1894 was the following: France imposed its higher general tariff on Italy, Switzerland and *Portugal*; Germany on Spain and *Portugal*; Italy on France and *Portugal*; Russia on Rumania and *Portugal*; and finally Switzerland imposed on Norway and *Portugal*.[1]

However, despite the importance of tariff policy, it is hard to think that had the capacity to export better quality wines, Portugal could not have managed to secure better trade agreements. People in power did not fail to recognize that, when it was necessary to justify what they were doing - or not doing. Francisco Veiga Beirão, the minister of foreign affairs, responding in parliament to the criticism on the successive failures of the negotiations for trade treaties, made by João Arroio (who would substitute him less than five months later), did not fail to argue that the lack of commercial treaties was not a cause of the decrease or stagnation of Portugal's exports.[2]

In this respect it is interesting to compare here Portugal with Italy, the third major wine exporter in Europe. In 1886, during the tariff reforms that led to the new generally more protectionist tariff schedule of 1887 (in effect in 1888), the Italian government renounced the trade treaty with France of 1881. Relations between the two countries had not been good since

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1. Cordeiro (1896, p. 233). For an analysis of the wine markets see Congresso Vinícola [...] (1902, pp. 120-59).

2. Diário da Câmara [...] (5-2-1900).

1877, when the French Chamber rejected the new treaty that would substitute for the one of 1863. As a consequence France waged a "tariff war" on Italian wine imports, which shrunk from a peak 97.3 million francs in 1887 to 1.3 million in 1890.[1] In the aggregate the economic effects of this war were not large because wine exports accounted at most for 6% of Italy's wine output (see table 3.8). Furthermore, Italy rapidly secured other markets for its wine and agricultural produce, by signing preferential trade agreements with its neighbours, Switzerland, Austria, as well as with Germany, in 1891-1892.[2] Thus Austria fully substituted for the French market, and Germany became Italy's most important trade partner.[3] These trade agreements, later confirmed in the years 1901-03, meant that Italian duties on industrial products from its trading partners were substantially reduced.

The duration of the trade agreements was generally short (up to ten years) and could be unilaterally renounced at any moment. When Austrian vineyards recovered from phylloxera by 1902 (ten years after France), the Austrian Government rescinded the special treatment it had conceded to Italian wines. According to Coppa (1970), Giolitti's government (1896-1913) managed to change

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1. Smith (1980, pp. 197, 201).

2. Besides silk goods, Italy was a successful exporter of agricultural goods such as hemp and olive oil, what was also due, according to Federico (1987, p. 18) to the superior quality of the products.

3. See Coppa (1970, pp. 753, 763), Zamagni (1990, chap. 3), and Milward and Saul (1977, pp. 232-33). For an alternative view, according to which Italy would have lost from this one decade long tariff war with France, see Pollard (1982, p. 261).

the special treatment accorded to wines, into preferences for other agricultural produce. This had positive consequences for Italian agricultural exports overall. After 1904 they returned to the previous growth trend.[1] Regarding the case of Italy, it is also interesting to note that in Rossi and Toniolo's (1991) analysis of the changes brought by the Giolittian era, the opening up of the economy, through commercial agreements, is listed together with a series of other economic and institutional contemporary changes: the creation of the Bank of Italy (1893-1895), the reduction of the state debt, exchange rate stability, and the increase in the inflow of emigrant remittances.[2]

We have given evidence here showing that the failure to sign trade agreements for Portugal could be a consequence of lack of capacity to increase further exports.[3] The example of Italy has shown too, that more important than securing trade agreements, it was necessary to keep in pace with the changing game of negotiations between countries: treaties lasted for short periods of time and it was necessary to redirect attentions and to be able to supply different kinds of exports to different markets. In this context, supply conditions appear of paramount

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1. Coppa (1970, pp. 63-64, 764). See also Eddie (1989, p. 839). For a view of Italian agriculture in general as efficiently exploiting its comparative advantages see O'Brien and Toniolo (1986).

2. Rossi and Toniolo (1991, pp. 8-10).

3. The idea that exports were not a vent-for-surplus is implicitly recognized by Teles (1903, p. 239), who argues that exports, as well as urban consumption, raised prices of essential goods in the rural areas.

importance.[1]

And distance also mattered. The table below depicts the pattern of the wine trade within Europe for the years around 1898, and it shows clearly that wine was predominantly exported to neighbour countries, or to countries to which nationals had emigrated. That was the case of wine imports into France, for instance, that came mainly from Spain and the French colony of Algeria; Germany imported wines mainly from Italy (through Austria or Switzerland) and France.

Patterns of wine trade (1896-1898)

	Imports from (% of total wine imports)					
Destination	Portugal	Spain	Italy	France	Aus.Hun.	Algeria
Aust.Hung. (1898)	0.0	0.3	98.6	0.3	-	-
Belgium (1898)	0.8	11.1	0.1	72.4	-	0.8
France (1898)	0.0	60.2	0.8	-	-	37.2
Germany (1897)	4.6	11.4	15.4	49.2	11.7	?
Switzerland(1896)	-	31.5*	40.3	11.8	6.6	-

(*) A print error in the source was detected by comparing with the total.
Note: Data from the statistics of the importing country.
Source: Congresso Vinícola [...] (1902, pp. 135, 143, 151, 155, 157).

When exposing his skepticism regarding the 1866 commercial treaty signed between France and Portugal, the protectionist minded Martins (1954) argued that the treaty would be ineffective because it could only bring benefit to wine exports, what

1. After recognizing the growth of output over the six decades to 1913, in the aftermath of World War I, Gomes (1920, pp. 114-16) had a different perception of the Italian potential to increase the output of exportables. According to this author, and in disagreement to what we have argued in the text, that potential was as low in Italy as in Portugal.

according to him, was not sufficient. In his characteristic style of mixing impressions with very precise figures, Martins argues that:

> "A difference of 20 or 30 kilometres in railroad is sufficient to compensate for the differential duty [given by the treaty]: and, when the average distances in Spain and Portugal are compared, it is concluded that even with a higher duty we would have the preference."[1]

Despite the conclusions set above, it has to be pointed out that the domestic costs for signing trade agreements was high. First - and mainly for fiscal reasons - Portugal maintained throughout a protectionist regime, and internal political forces did not favour its dismemberment. Portuguese politicians were not in a position to trade tariff reductions with its partners. Politicians earned a revenue for government, and private investors kept their mark-ups. Moreover, British Foreign Office officials complained about Portugal being a difficult partner to deal with, because its negotiators were always changing due to the succession of unstable governments. However, if that was true, in view of the constraints here pointed out, we have to cast some doubt on whether this was due to incapacity to change towards a more consistent foreign policy, or just unwillingness

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1. Martins (1954, p. 123). It is implicit in this sentence that exports of common wine were mainly seaborne, what may not be exact, if it is considered that Spanish exports of common wine to Portugal (though relatively unimportant) were carried by land, as it may be seen in the Spanish trade statistics for the years 1880 and 1890 (for the source see appendix B).

to do so.[1]

Another line of argument that might explain the lack of commercial treaties after the mid-1880s is linked to the relative unimportance of the Portuguese market, a far distant poor compensation for preferential treatment from the larger importers in Europe or North America. This is evident from the British reaction to Portugal discriminating against her products as a retaliation of the preferential treatment that Britain had given to French wines after the Cobden-Chevalier treaty of 1860. Despite the complaints from British merchants who were paying higher import duties in Portugal from 1866, Britain kept wine duties according to the alcoholic content, providing a *de facto* preferential treatment for French lighter wines. There was not much Portugal could do about it, and in 1876, after 10 years of negotiations with Britain and after at least three years discussion in the parliament, Portugal finally gave the most favoured nation clause to Britain without compensations in return.[2]

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1. Bonifácio (1989b), in a most comprehensive recent work centred on the analysis of the negotiations of the 1842 Anglo-Portuguese treaty, shows clearly the difficulties of a small power's diplomacy. However, her description of the negotiations shows that Portuguese diplomacy managed to take advantage of the new favourable international context, that it was consistent despite changes in government, and that it managed to obtain important political concessions from Britain, and to give in return less than Britain was asked. See in particular Bonifácio (1989b, pp. 429-46).

2. See Parliamentary Papers (1876, pp. 759, 782, 792), and Lains (1986, pp. 402-3). Spain also suffered from this discrimination and reacted in the same fashion. See Saul (1960, pp. 137-41).

3.5 - Portugal and the *European System*

Most commercial treaties within Europe were signed between countries with more intensive trade links, meaning in most cases neighbouring countries. For example, the protectionist upsurge in the late 1870s was partially overturned by the concession of the most-favoured-nation clause in a succession of treaties fostered by the new German Chancellor Caprivi, lasting twelve years from January 1892 to December 1903, among the countries of the so-called *Central European System* that is, Belgium, Germany, Switzerland, Austria-Hungary, and Italy, to which later adhered also Russia, Rumania and Serbia.[1] Two fundamental elements facilitated this network of treaties, both of which were potentially absent for Portugal: geographical proximity and, most importantly, different levels of economic development and correspondent trade specialization.[2] Although Belgium, Germany, and Switzerland were mainly manufacturing exporters, they specialised in different types of manufactures, with different

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1. Eddie (1977, p. 333) and Pollard (1982, p. 259).

2. For the importance of development levels in determining trade patterns see, among others, Leamer (1974, p. 372). The literature concerned with the effects of distance on trade patterns is far from abundant. See as a good exception Beckerman (1956). The model in Leamer (1974) also includes distance as an independent variable.

levels of capital intensity. In exchange for their exports, these countries bought Mediterranean crops from Italy, and cereals from Russia and Rumania. The Habsburg Monarchy, having this kind of specialization within her borders, competed neither with the Northern industrialists nor with the Southern or Eastern agricultural producers. With this "system" the benefits of commercial treaties were evident, and would readily be signed once the hegeamonic ambitions of the involved powers, namely Prussia and Russia, were safeguarded.[1]

With half of her borders facing the cold Atlantic waters, Portugal had as her only contiguous potential trading partner Spain. The potential benefits agricultural exporters from Italy, Hungary or Russia could gain from their bordering countries, Portugal could expect to gain from trading with Spain. In this context the example of the Austrian-Hungarian customs union may be rather insightful, if we consider that the utmost success of Portugal's commercial policy would be a similar union with Spain, bringing Portugal into the French and German market by a Spanish hand. A political union of the two Iberian countries was in fact proposed by Spain when, following the monarchic *Restauración* of 1869 Spain's prime minister Prim was looking for a King for his country. He proposed, to the great joy of the *iberistas*, a union under the Portuguese king, D. Luis, or his father, D. Fernando,

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1. An example of the links between geo-strategic preoccupations and commercial links may be given by the history of the independence of the Balkan states in the late 1870s (see Jelavich, 1984).

with a capital in Lisbon or in Santarém, one hundred kilometres from Lisbon. This project faced the opposition of many of those used to take with suspicion any move, in any direction, from Madrid. The historical weight of the several conflicts and wars between the two countries was certainly determinant.[1] But in spite of the importance of the events of political history, we no doubt have to consider that the potential economic benefits of such an union were relatively reduced, as may be demonstrated through the experience of the Austria-Hungarian customs union.[2]

Having lost the Independence War in 1848/49, Hungary was incorporated in Austria, leading to the fall of all trade barriers by "constitutional imposition".[3] By 1851, trade was

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1. See Martins (1979, pp. 292-97) for a short review of the attempts to build an Iberian Union, to which an anonymous author in the book *Iberia* named the Iberian *Zollverein*. The fear that simple commercial negotiations with Spain would be used as an excuse of the oppositions and newspapers to accuse the government as wanting a political union within the peninsula is patent in the blue books of the *ministério dos negócios estrangeiros*. See Negócios Externos (1885, II, 1). The fear of a customs union endangered the negotiations of commercial treaties at least in the late 1880s. The Portuguese ambassador to Madrid warned his minister of the consensus among free-traders and protectionist in the Spanish parliament regarding a customs union with Portugal, which could endanger the ongoing negotiations. See Negócios Externos (1893, II, 100). See also Vazquez (1975) for a study of the political relations between Spain and Portugal by the end of the century.

2.The Habsburg Monarchy is here taken as an example because it is the experience of economic integration between two countries in nineteenth century Europe which is best documented in statistics.

3. Eddie (1977, pp. 330-31). The ultimate reason was certainly not a formal one, but the political will to do so (see Komlos, 1983, pp. 4-5). The elimination of tariffs within the two countries had already started in the last quarter of the eighteenth century. According to Komlos (1983, p. 4), by 1775 a part of the Habsburg Monarchy constituted already the largest free-trade area in Europe.

completely free, not only within the Monarchy but also in respect to third countries. When the treaty of *compromise* was signed in 1867, the Habsburg Monarchy was as a free-trading country as most Western European countries. Tariffs were increased successively in 1878, 1882 and 1887, and in 1906. Commercial policy did not impose the actual trade patterns between the two countries, instead "protectionism [towards third countries] worked to preserve traditional patterns".[1] Austria provided a secure market for Hungarian agricultural exports, whereas Hungary imported a considerable part of Austrian manufactured exports. From 1885 to 1910 Austria bought 72-75% of Hungarian exports, and sold to Hungary a large though slightly declining share of her exports, 83% in 1885 and 74% in 1910. Trade outside the Monarchy was rather differently shaped: whereas Hungarian imports from Austria were consistently composed of manufactures (86% throughout 1885-1910), her imports from other countries were mainly of agricultural products (declining from 70% in 1885 to 68% in 1910). On the other side, Hungary exported mainly grains, animals, and animal products to Austria, whereas to third countries the share of manufactured goods (mainly flour) peaked

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1. See Eddie (1977, pp. 332, 335). For an analysis of trade patterns before and after the war see Komlos (1983, pp. 112, 116-18). This author provides a thorough analysis of cost and benefits of the Habsburg customs union. See also Spechler (1989, pp. 7-9).

at 48% by 1910.[1]

This brief description of trade within the Habsburg Monarchy is sufficient enough to show how exports from Austria and Hungary had specialised. The contrast with the trade patterns of the two Iberian countries is evident, and more is it so if we take into account, as already mentioned, the possibilities of further specialization near the borders. The complementarity between Austria and Hungary was evident at all levels: Bohemia, in lower Austria, was a traditional cotton producer which she could exchange for Hungarian wheat. In a happy parallelism to Germany's "marriage of iron and rye", Eddie (1977) has named the complementarity over the Austria-Hungarian border as the "marriage of textiles and wheat".[2] More importantly, where complementarity between the two countries was weak, a major push could come from capital exports from Austria to Hungary. In fact, according to Komlos (1983), Austrian capital allowed Hungary to develop a "modern large-scale" flour milling industry, which was to become by 1913 one of the main sources of exports from Hungary to Austria.[3]

If the structures of Portuguese and Spanish economies as

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1. This pattern of trade specialization was certainly present within other large countries such as Germany and Italy, but only for the case of the Habsburg Monarchy were trade flows recorded (although systematically only after 1882). Information on trade shares is from Eddie (1977, pp. 333-36, 349). For trade patterns in the 1840s, see Komlos (1983, pp. 116-18).

2. Eddie (1977, p. 351).

3. Komlos (1983, pp. 112, 141-42). For the role of capital in the relations between Germany and Italy see Hertner (1984).

shown by actual trade patterns, are compared, the weak economic drive for a customs union appears as evident. When in June 1887 the commercial treaty with Spain signed in 1883 came to an end, Casal Ribeiro, the ambassador to the Spanish court, regretting that the public opinion did not have a say on the grand themes of Portugal's foreign policy, argued that there were no reactions in Portugal because

> "[...] considering just the economic interests, there were no reasons to regret the end of the conventional regime established by the 1883 treaty."[1]

He then proceeds by contesting the idea that the identity of the conditions of production between Spain and Portugal limited the possibility of mutual tariff concessions that could be advantageous for both, and he goes on his extensive report listing the products upon which reciprocal trade could be promoted: fisheries, minerals, olive oil, cork, wine, wool, and cattle.[2]

Despite the optimism of such writers, the fact is that nineteenth century international trade was seldom intra-industry trade and even less so was it trade within the same range of

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1. Negócios Externos (1893, II, 109, p. 209). ["[...] considerando apenas os interesses económicos, não havia motivo de lamentar a desaparição do regime convencional estabelecido pelo pacto de 1883. E, quanto a outra ordem de considerações, que se prendem com as linhas gerais de uma boa política portuguesa, essas não são entre nós frequente assumpto de cogitação de grande número [...]"]
For the trade patterns between Spain and Portugal see Pinheiro (1987).

2. Negócios Externos (1893, II, 109, pp. 213-25).

agricultural goods. Both Iberian countries were exporters of the same range of agricultural goods. The few manufactures exported were of lower quality grades and thus presumably not competitive in neighbour markets. Other important imports, such as coal and wheat came in both cases from Britain and the United States, and none of them were exported at competitive prices from either Spain or Portugal. The lack of economic complementarity is even more evident when closer attention is given to the possible interactions in the border regions, which had similar ecological conditions, either in the North or the South-West part of Portugal, and thus similar agricultural specialization.[1]

As already referred to above, capital exports may be seen as some kind of substitute for lack of complementarity between two countries or regions. Most of nineteenth century capital exports were directed to social overhead capital, namely transport, that direct or indirectly help promoting exports. From 1869 to 1914, the net flow of capital in the US was dominated entirely by the movement of foreign funds into the American railroad. France financed the construction of Spanish railways, which carried Spanish wine and fruits to France. Also in the case of the Ottoman Empire foreign capital was invested mainly in railways

1. Neither the construction of railway lines promoted trade between the two countries. Spanish railways were designed mainly to reach Spanish ports, what implied that an "iron belt" was built in a line parallel to the border. Pinheiro (1987, p. 73), stressing political factors, concludes that such belt was the cause of the limited commerce between the two countries, and that it derived from the Spanish "refusal" to increase Iberian economic integration in the late century. This argument implies that railways could have created trade, what remains to be proved.

and ports, favouring export expansion.[1] As such, if the economies of Portugal and Spain had few possibilities of complementarity, one may assume that these could be increased by capital flows between the two countries. But this possibility only helps stressing further the lack of complementarity between the two countries, because both were net importers of capital.

Foreign capital in Portugal came necessarily from major capital exporters, namely Britain and France. When it helped export expansion, it was directed to those exports that could concern these countries. This is also the pattern that we find in the Habsburg Monarchy, as elsewhere in what we could designate the *third* European periphery, namely the Balkans, the Ottoman Empire and of course Spain.

In conclusion, export growth in Portugal (and elsewhere) depended *both* on the capacity to invest in new products with better markets and on the capacity to secure markets by political negotiation. The success of the negotiations of commercial treaties, on the other hand, depended on the capacity to attract the interest of the potential partner. Portugal was not in a particularly good condition to attract the interest of the large industrial European countries that could buy the products that Portugal was offering from other nearby agricultural exporters. To compete in this unfavourable environment, Portugal would have to provide other type of goods, or to specialize in particular

1. See Williamson (1964, p. 124 and chap. 4) and Pamuk (1987, p. 72).

markets. This was done in part, but it was evidently not enough to the extent that export growth by volume was reduced after the mid-1880s. Yet, such specialization would have required structural changes in the economy, as it had happened in Scandinavia. In that case the "failure" of the export sector is related to the "failure" in fostering structural changes in the domestic economy. And even if no clear conclusion can be drawn on the direction of causality between exports and economic growth, it is hoped that this chapter has shown that the causal link is not necessarily from the former to the latter.

CHAPTER 4

IMPORTS, THE BALANCE OF TRADE AND GROWTH, 1842-1913

4.1 - Introduction

In the literature on Portuguese economic history, imports appear in many instances as a crucial variable. In fact, they have been used to identify cycles of industrial and agricultural growth, or to infer about trends in capital formation. This is basically correct. Economic growth in a small country such as Portugal, in the context of expanding international trade, is increasingly dependent on imports as source of supply for consumer goods and industrial inputs. Trends and fluctuations of

imports are thus indicative of trends in national consumption, production and investment. On the other hand, changes in the product composition of imports reveal the structural changes in the economy at large. But this is only part of the story. Instead of studying import trends to draw conclusions on output, we shall look here for the major determinants of their growth and fluctuations, in terms of domestic demand for imported goods, as well as in terms of the capacity to pay for imports. Because the new data on output growth set in chapter 2 is used in interpreting import trends - and not the other way round - some of the doubts raised by the historiography on the relation between output growth and imports will be clarified.

This chapter deals with trends in the balance of merchandise trade too. The revision of trade statistics has led to an important revaluation of the trade balances, in particular for the period after the abandonment of the gold standard. As opposed to exports, imports were valued at market exchange rates. Thus, in the periods after 1891 when the Portuguese currency was depreciating, import values increased in correspondence, but official values for exports did not. Consequently, the official statistics incorrectly registered a deterioration of the balance of trade in those periods. The attention devoted to the "official" trade deficits by contemporaries and historians will appear as unfounded in many instances. The revised values for the balance of trade will give a diverse picture of the constraints imposed on Portuguese economic growth by the capacity to pay for

the needed imports. Aggregate import figures were also revised to take into account smuggling and the incorrect record of transit of animals over the Spanish-Portuguese border as trade flows. The details are presented in appendix B.

The structure of the chapter is as follows. Section 4.2 presents trends and fluctuations of imports and analyzes its determinants, firstly in terms of domestic production and, secondly, in terms of the capacity to import provided by exports, and by other sources of foreign earnings; section 4.3 outlines the major changes in the composition of imports, and shows how it was affected by difficulties felt in the external balances; section 4.4 analysis how the balance of trade acted as a constraint on Portuguese economic growth, by way of estimates of demand functions for imports and exports; these estimates are presented in an econometric appendix at the end of the chapter.

4.2 - Trends and fluctuations

From the mid-1850s to World War I the trend growth rate of imports was close to 2.5% per year, in both volume and value terms. The value of imports increased most rapidly from 1843 to 1867 and again from 1900 to 1913, at annual rates close to 3.5%. The three decades in between, from 1867 to 1900, registered

slower yearly growth rates in the 1.5-2% range.[1] Import trends in terms of volume were quite different. In fact, the growth of import volumes was slower until 1867, and from 1867 to 1890 it jumped to rates between 3.6% and 4% per annum. After the peak in 1890, the growth of the volume of imports dropped considerably, recovering after the turn of the century. That extraordinary break on the curve of imports has been the source for some discussion, already mentioned in chapter 2, and it needs to be further explained. It should be noted, however, that the attention given to the depression in the 1890s has blurred the attention deserved by the recovery that followed in the first decade of the twentieth century.

1.The analysis carried on here is based on the revised import series, although official figures are given in the relevant tables to allow for comparison. It should be recalled as well that the series is incomplete from 1842-1865, and thus growth rates were computed between years that are not necessarily peaks, as after 1865.

Table 4.1

Growth of Imports
(yearly peak to peak growth rates, %)

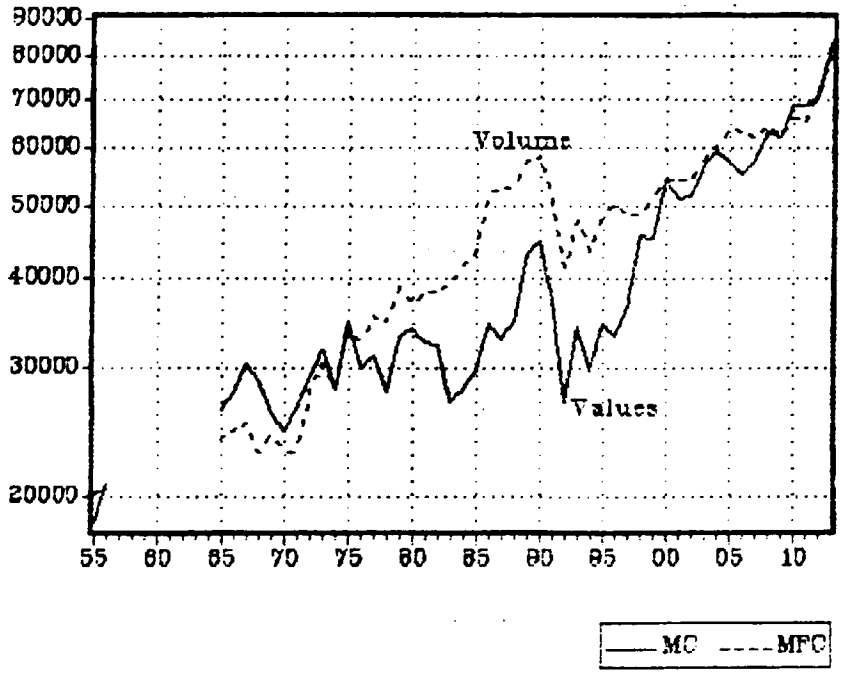
Periods	Value		Volume	
	Official	Revised	Official	Revised
1843-1856(1)	3.58(*)	-	1.80	[1.80]
1856-1867(1)	2.67(♯)	3.53	1.15	1.89
1867-1875	3.34	1.72	5.34	3.98
1875-1890	1.76	1.66	3.58	3.58
1890-1900	3.03	1.98	0.95(+)	0.60(+)
1900-1913	3.11	3.32	3.22(")	2.91(")
1856-1913	2.69(&)	2.46	2.60	2.42
1865-1913 (trend)	2.38	2.07	2.60	2.29

(1) Up to 1865 the series are not continuous and the years chosen as peaks for the first two periods in the table are best guesses.
(*) 1843-57; (♯) 1857-67; (+) 1890-1905; (") 1905-13;
(&) 1857-1913.

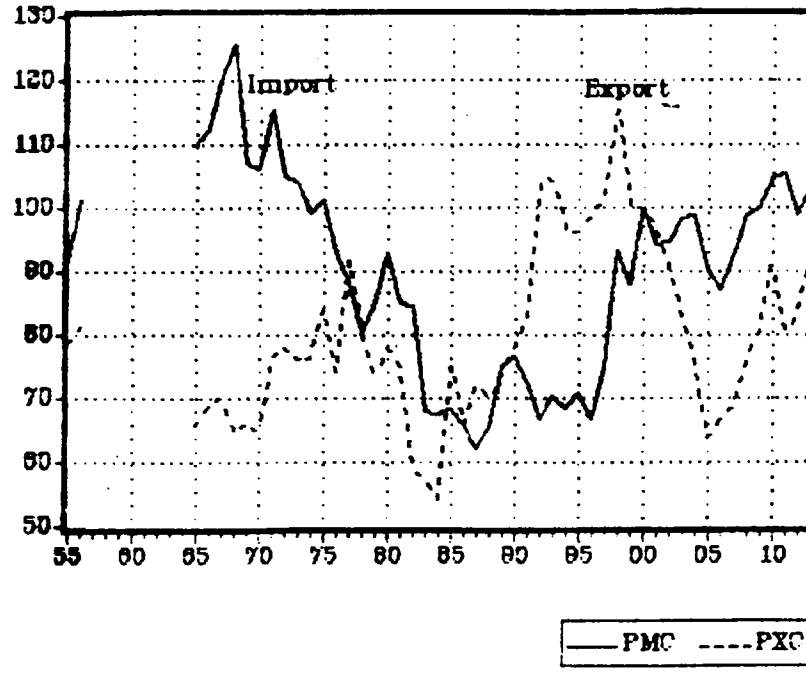
Notes: These corrections apply to official values (i.e., prices), and also to volumes because of smuggling. Peaks were estimated in relation to a trend linear regression of the type,
Log M = c + a.time + ut
Last row in the table is the coefficient "a" for the regression for the mentioned period. The complete series start in 1865, thus until that year the peak years in the table are only proximate (cf. table 3.1).
Source: Computed from appendix C.

Import prices (including tariffs) went up to 1869, decreased to 1888, and recovered thereafter, with a peak in 1900 followed by a flat trend during the first decade of the twentieth century. At the end of the period, however, the import price index was at a level inferior to the previous peak in 1869. These trends somehow reflect the great depression in international prices from 1873 to 1897, and in particular the fall of British export

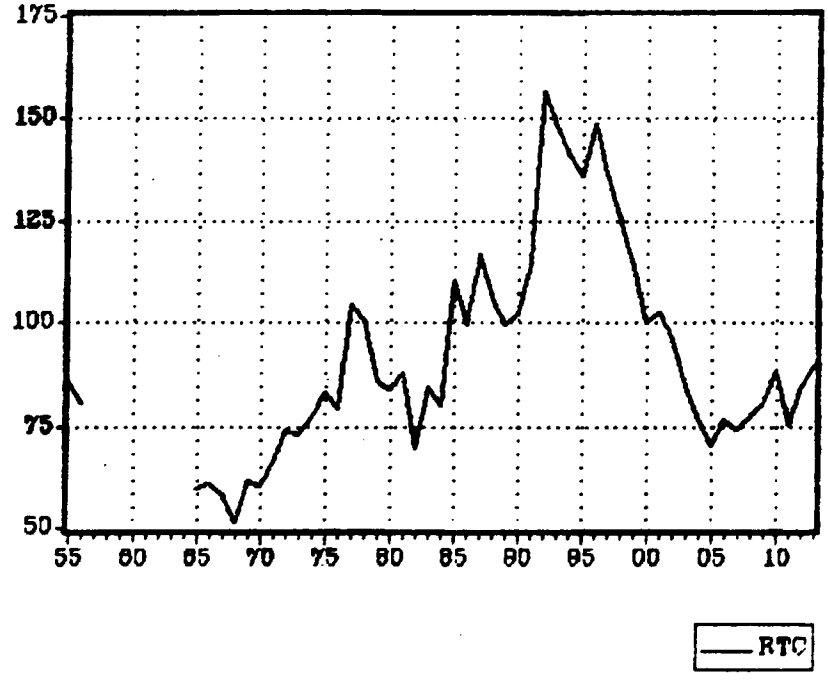
Graph 4.1 – Imports (revised)



Graph 4.2 – Prices (1900=100)



Graph 4.2 – Terms of trade (1900=100)



prices.[1] The different turning points in domestic and international price curves is of course explained by changes in Portugal's nominal tariffs and by the specific composition of Portuguese imports as compared to world exports.

Portugal was mainly an exporter of primary products, while its imports were essentially composed of manufactured goods and industrial inputs. This fact has induced historians to draw conclusions about agricultural or industrial growth directly from trends of aggregate exports or imports, respectively. This is of course a rough simplification, which excludes the possibility of substitution effects. A contraction in exports is not necessarily associated with decreasing output, if sales for the internal market substitute for sales abroad. By the same token, increasing imports may reflect higher competition from foreign producers, as well as an increase in domestic consumption. This is not a trivial remark. Nunes et al. (1989), as we have noted in chapter 2, take aggregate imports as one of three proxies for estimating GDP growth. In consequence the sharp decline in imports that occurred in the early 1890s is proportionally reflected in their estimates for national output growth. The possibility of import substitution is not considered. The same problem arises with Pereira's (1983) conclusions on the development of agriculture, which are basically drawn on export statistics. It is worth noting that these approaches have a tradition that goes back at

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1. See Imlah (1958, pp. 101-3).

least to Martins (1958) who, writing in the early 1880s, asks "is not foreign trade the safer yardstick to assess a nation's progress?"[1]

To account for import substitution, the relation between imports and output has to be studied in a disaggregated form: a part of total imports is for industrial use, and as such we may expect these imports to grow with industrial output; other imports, mainly of consumer goods, are substitute for either agricultural or industrial domestic output, and in this case imports and output may be negatively correlated.

As one could expect having in mind what has just been mentioned, the comparison of output indices and import trends do not show any constant pattern linking growth rates of aggregate export and import, to the growth of agricultural and industrial output. As a matter of fact, the first cycle of rapid expansion of imports, between 1867 and 1875, is contemporaneous to high growth rates for industrial output. During that period, import demand induced by the growth of the industrial sector offset the depressing effect of the stagnation in agriculture, which lasted for almost two decades from 1852 to 1870. In the period from 1867-1875 import growth derived mostly from the import of inputs

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1. Martins (1958, vol. 1, p. 71). ["É ou não é o comércio externo o metro mais seguro para se avaliar o progresso de uma nação?"]. See also Pery (1979, p. 89), who writes in the 1880s. An historian that uses incorrectly export statistics is Schwartzman (1989, pp. 83, 85) who concludes that the largest sector of Portuguese economy was the "agro-export" sector, by giving the share of agricultural exports on total exports, without taking into account the share of exports in national output.

required by the Portuguese industry, as will be shown in more detail in next section. During the subsequent period, from 1875 to 1890, the volume of imports continued to rise, whereas the rate of growth of industrial output decreased. Demand for imports could be now responding to the increase in aggregate demand generated by agricultural growth, particularly high from 1870 to 1903, and to general favourable economic conditions. Consequently, the composition of the imports changed and consumer goods increased their share after 1875.

Table 4.2

Growth of Foreign Trade and Physical Output in Portugal
(peak to peak growth rates in real terms, %)

Foreign trade				Physical Output			
Exports		Imports		Agriculture		Industry	
1842-1856	2.86	1843-1856	1.80	1846-1852	1.44	na	
1856-1865	1.64	1856-1867	1.89	1852-		1854-1865	1.78
1865-1874	4.89	1867-1875	3.98	-1870	-0.27	1865-1875	4.17
1874-1886	3.44	1875-1890	3.58	1870-1885	1.40	1875-1890	1.87
1886-1898	1.62	1890-1900	0.60	1885-1903	1.44	1890-1900	2.66
1898-1910	1.57	1900-1913	2.91	1903-1912	-0.79	1900-1911	2.43

Sources: Tables 3.1, 4.1 and appendix A.

Table 4.3

Exports Imports and Trade Balances
(contos)

Period	Official Values			Revised Values		
	Exports	Imports	BOT	Exports	Imports	BOT
1842/1843	6 189	11 066	- 4 877	na	na	na
1848/1854(*)	9 099	11 087	- 1 988	na	na	na
1855/1856	13 343	17 647	- 4 304	16 078	19 641	- 3 563
1857/1860(*)	13 528	19 422	- 5 894	na	na	na
1861	13 249	24 717	-11 468	14 343	29 038	-14 695
1865/1869	15 502	25 064	- 9 562	15 786	27 961	-12 175
1870/1874	20 680	26 715	- 6 035	23 849	28 086	- 4 237
1875/1879	19 614	31 961	-12 347	25 339	31 558	- 6 219
1880/1884	22 169	32 801	-10 632	24 263	30 876	- 6 613
1885/1889	22 356	37 413	-15 057	32 346	35 132	- 2 786
1890/1894	22 976	37 723	-14 747	37 317	34 664	2 653
1895/1899	28 068	43 805	-15 737	55 367	39 154	16 213
1900/1904	29 792	58 798	-29 006	53 713	54 876	- 1 163
1905/1909	29 846	62 905	-33 059	44 811	59 386	-14 575
1910/1913	34 848	75 307	-40 459	64 945	73 060	- 8 115

(*) Estimated from partial data on trade through Lisbon and Oporto.
Notes: The major revisions are the following. Until 1870/74 the revision of imports is due to smuggling from Spain. Between 1890/94 and 1910/13, imports are revised downwards because the transit of live animals to and from Spain was subtracted. From 1890/94 exports were revised upwards because official statistics valued them (but not imports) at the par exchange rate, lower than the market rates.
Sources: appendixes B and C.

But imports were not determined only by demand for industrial inputs, foodstuffs, or manufactures, but also by changing conditions in the domestic supply. In particular, the break of import growth in the early 1890s is hard to explain in terms of demand, because there was an increase in the rate of industrial growth after 1890, and agriculture continued to expand until 1903. Import trends were also affected by import

substitution, in particular in the case of cottons and wheat. Following the trough in 1892, however, imports increased again at a fast pace and the previous peaks were reached in 1897 in terms of import values and in 1900 in terms of import volumes.

It is often the case, in particular in less developed economies, that demand for imports depends not only on national income and relative import prices, but also on the capacity to finance import flows. This issue will be addressed here by looking into the available evidence on two major sources of revenue of foreign currency: exports and emigrant remittances. Evidence on emigrant remittances is scanty, and there was no attempt to estimate the flows of capital imports, because that would involve a full research project, given that there is no readily available information.[1]

The importance of exports in relation to imports is evident in table 4.3. The revised balances of trade show persistent trade deficits until the 1890s, surpluses in the 1890s, and deficits again after the turn of the century. This picture is in clear contrast with that drawn by contemporaries and historians based on the official data.[2] Graph 4.3 compares the growth of the value of imports to the growth of the capacity to import provided by

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1. Mata (1984, pp. 10-17) provides an attempt at estimating the balance of payments for 1891-1913, and for the earlier period (1865-1890) there is a more recent provisional estimate from Reis (1991b). The two series cannot be linked because of the differences in methodology.

2. For more details regarding the correction of the statistics see appendix B.

export earnings, defined as the value of exports deflated by the import price index or:

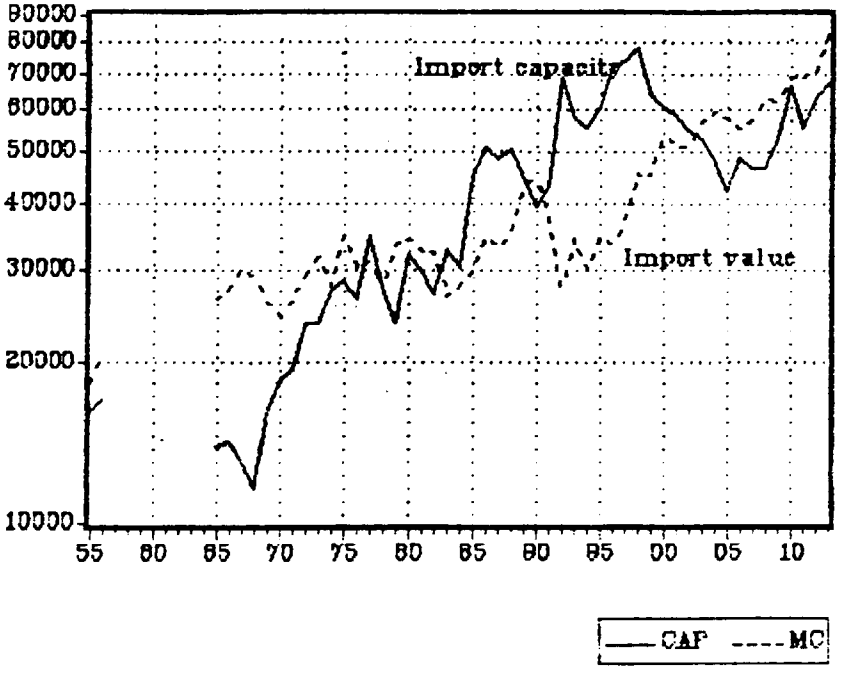
$$CAP = QX \times PX/PM$$

The capacity to import (CAP) increased considerably from 1865 till 1877, as a consequence of the increase in export volumes (QX) and the improving terms of trade (PX/PM), that peaked respectively in 1874 and 1877. In the following years there is a flat trend, and it was reversed after 1884 when, despite the contracting growth in export volume, the capacity to import increased again. This favourable period, lasting for 14 years (1884-1898), was largely due to the upward movement in the terms of trade, with export prices increasing more than import prices. The exact turning points in the prices of exports, imports and the terms of trade are shown in graph 4.2 above. After 1898 the capacity to import was still affected by fluctuations in the terms of trade, in particular of export prices, due to variations in the exchange rate.[1]

It is worth noting in graph 4.3 that the curve for imports lies below the curve for capacity to import for most of the period from 1885 to 1903. In consequence, the contraction in imports during the 1890s, which is one of the most important features of imports to be explained here, could not be a consequence of unfavourable changes of the purchasing power of exports. A conclusion to retain is that fluctuations in imports

1. The terms of trade are from Lains (1986). Sideri (1970) estimated Anglo-Portuguese terms of trade which are discussed in Lains (1986, p. 388n).

Graph 4.3 – Imports and import capcity



were not always determined or conditioned by fluctuations in the capacity to import provided by exports.

Emigrant remittances are the other main source of foreign revenues which could have conditioned imports. There are no reliable and consistent estimates for the flow of remittances sent home by Portuguese emigrants and, consequently, we can only draw tentative conclusions regarding the matter. The largest colony of Portuguese citizens abroad was by far in Brazil, and the importance of the funds they send directly or indirectly via London to Portugal is often mentioned in the literature. In fact they reached amounts that could easily surpass the value of Portugal's trade deficit.[1] Fortunately enough, we have partial information on remittances that can help us draw some conclusions on their relation with import fluctuations, during three particular moments, which are: the import peak in 1875, the fall in the early 1890s, and the recovery after the turn of the century.

In the early 1870s, according to Vieira (1983), the remittances from Portuguese emigrants in Brazil went up extraordinarily to about £ 2 million per year (or 9,000 contos at the current par exchange rate). This was an immediate consequence of the return to peace in Brazil after the end of the Paraguayan

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1. The most complete study of the effects of emigrant remittances on Portugal's balance of payments after 1891 is still Salazar (1916, Chap. 7). For a brief review of the large contemporary literature see Pereira (1981) and (1983, pp. 253-61). See also Cabral (1979, pp. 53-55), Vieira (1983, p. 9), and Justino (1989, pp. 88-93).

wars (1865-1870). The estimated inflow of funds roughly corresponds to twice the size of the average yearly trade deficit for 1870-1875.[1] Its effects in the economy were certainly large, and in particular in the financial sector. According to Pereira (1983) this great inflow of money led to a boom in the creation of banks, whose total number in Portugal increased from 15 to 51 in the short period between 1873 and 1875, the new banks being all established in the areas of major emigration from the north of Portugal.[2] It is tempting to relate the import peak observed in 1875 to this particular inflow of foreign revenue. Furthermore, if the banking boom is somehow related to the pace of industrial growth in the first half of the 1870s, then we can conclude that remittances provided the funds to finance an industrial upsurge, which was largely dependent on imported inputs. In 1876 this short-lived boom burst into a financial crisis which Martins (1956) relates to the adverse speculation with Portuguese and Spanish funds, the latter being severely affected by the disturbances in Spain following the *Restauración*.[3] Because of the crisis associated with the

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1. Justino (1989, pp. 88-89) concludes that remittances accounted for little more than the trade deficit in 1872. Our values do not agree with Justino's because he erroneously uses a different exchange rate (£1=3$500), and compares with the official trade deficit.

2. Pereira (1983, 257-60). See also Cabral (1981, p. 267) and Justino (1989, pp. 87-90 and 211-17).

3. According to Martins (1956) the 1876 crisis is an example of the inconveniences derived from competition in bank-note issuing, which was the regime in vigour in the north of Portugal.

extraordinary sums of money sent from Brazil, some authors like Martins (1956) and Pereira (1983) do not hesitate to conclude that remittances had a negative impact on the Portuguese economy.[1] This is probably exaggerated, given the important role of remittances in the credit side of the balance of payments. However it has to be recognized that the funds imported from Brazil did in fact cause disturbances in the economy.

In the late 1880s emigrant remittances had again a disturbing role. For this occasion Pereira (1983) gives yearly values for transfers from the Brazilian agencies of the Banco de Portugal to London (see table 4.4), which, according to contemporary estimates, could account for up to half of total remittances.[2] The decline in those transfers, starting already in 1889, is noticeable. Again these movements are explained by fluctuations on the Brazilian exchange rate, which according to Fishlow (1989), was affected by the disturbances caused by the end of slavery in 1888 and the difficult installation of the Republic from 1889.[3] The associated contraction of remittances and the contraction of imports in the early 1890s is striking. First on timing: both remittances and imports peaked in 1888 and were

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1. See Martins (1956, pp. 48-51) and Pereira (1983, pp. 257-61).

2. See Pereira (1983, p. 255) and (1981, pp. 36-37). Mata (1984, pp. 13-14) gives a summary of contemporary estimates of remittances.

3. See Fishlow (1989, pp. 22-23). Between 1890 and 1899 the index for the exchange for Brazilian milreis to the pound went up from below 50 to about 140 (Cardoso, 1989, figure 3C.2).

severely affected in 1890. Second between 1888 and 1891 the known transfers fell by more than 80%, that is by 3,531 contos, and the contraction of imports in the 1890s was almost fully concentrated in these same years, falling by about 30% or 11,014 contos. If it is assumed that the fall in the transfers through the Banco de Portugal was proportional to the total, we may hypothesise a decline in remittances of circa 7,000 contos. The fall in imports could thus be largely explained by the decrease in emigrant remittances. Table 4.4 also shows that remittances sent to Portugal through the *Agência Financial do Rio de Janeiro*, the bank created in 1887 and that would became the main financial channel for remittances from Brazil, were more than twice as large in the 1900s than in the 1890s.[1] Again, we cannot use this figures to depict yearly fluctuations because we do not know their relative importance year by year, but they do point out to the conclusion that remittances eased the pressure on the balance of payments after the turn of the century.

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1. See Pereira (1981, pp. 39-44). According to this author transfers of money through that agency accounted for 1/4 of total remittances.

Table 4.4

Transfers from Brazil to Portugal

Banco de Portugal			*Agência Financial*	
Year	Pounds	Contos(*)	Year	Contos
1877	743 217	(3 365)		
1878	568 150	(2 557)		
1888	967 856	(4 355)		
1889	719 267	(3 237)		
1890	425 640	(1 915)		
1891	183 213	(824)		
			1892	751
			1893	820
			1896	1 391
			1897	1 729
			1898	1 769
			1899	2 971
			1900	3 434
			1901	3 212
			1902	4 381
			1903	4 264
			1904	5 832
			1907	3 705
			1908	4 770
			1909	3 902
			1910	3 724
			1911	2 935
			1912	3 662
			1913	3 909

(*) Converted at the par exchange rate.
Sources: Pereira (1983, p. 255) and (1981, p. 44).

Long-term trends in the growth of imports were probably more dependent on the growth of the domestic economy. Nevertheless, the two important swings of imports in the mid-1870s and the early 1890s, and the upsurge after 1900, were to a great extent due to fluctuations in emigrant remittances. As has been noted by Pereira (1983), among other authors, the flow of emigrant remittances was intimately related to Portuguese capital imports. It is difficult however to know what part of the capital imported from London was in fact derived from funds originated in Brazil.[1] Capital imports might have followed the trends in emigrant remittances, falling in the years after Portugal left the gold standard, and then recovering during the decade that preceded the outbreak of the war. These trends would agree with those shown by capital exports from Britain and, to a lesser extent, from France, the two major nineteenth century capital exporters for which there is data (the other is Germany). British capital exports peaked in 1889-1890, decreased until 1901, and increased

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1. See Vieira (1982, 177-80). Cabral (1979, p. 53) argues that emigrant remittances were in the whole more important than capital imports. One element that might have had some importance in this context is the flow of domestic capital abroad. It is not possible to predict what happened after 1889-91, because this financial crisis was not only domestic. So, capital might have flown the country for higher security, or might have been repatriated because of less investment opportunities abroad. In any case, it should be recalled that contemporaries considered Portuguese exports of capital as considerable in same occasions. See, for instance, Andrade (1918, pp. 229-30). Capital exports from poor countries should be studied. In another context, Carreras (1990, pp. 155-56) argues that the repatriation of capital following the loss of Cuba and Puerto Rico was of considerable importance for the Spanish recovery in the last decade of the century.

steeply thereafter. According to Simon's (1968) curve for new portfolio foreign investments, there was some recovery during the decreasing period in the years 1895-1899.[1]

But the ascendant section of the import curve started in 1892 (in both value and volume trends), before the change in the trend of foreign funds referred to above, meaning that some other elements were in action. In fact, the rise of imports after that year was sustained not only by the increase in exports' capacity to import, following devaluation, but also by the revenues in foreign currency earned by reexports from the African colonies, to which analysis we now turn.

The reexport trade from the African colonies through the mother country in the direction of northern Europe and the United States, increased considerably after 1892 because the colonial tariff of that year imposed a preferential treatment for reexports carried out through Portugal.[2] The reason why reexports

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1. See Simon (1968, p. 38), Imlah (1958, pp. 70-75), Edelstein (1982, pp. 313-14) and for France, Lévy-Leboyer (1973, p. 80). This same argument regarding Portugal is made in Marques (1991, pp. 27-29). According to the scanty available evidence, Spain's capital imports had a trend similar to imports into Portugal. For instance, according to Tena (1987, p. 12), foreign direct investment declined in 1891-1900, and increased in 1901-1913. In the case of Italy, capital imports also fell after 1890. However it is worth noting that after that year, according to Toniolo (1988, p. 36), capital imports were no longer fundamental to finance the balance of payments, and that in 1907 Italy was already a net exporter of capital, albeit in small amounts.

2. From 1892 Portuguese exports to Africa paid in most cases between 10 an 20% of the duties, reexports of foreign products through Lisbon paid 80%, and foreign direct imports paid 100%. See, for instance, Pautas vigentes [...] (1892). The importance of colonial reexports earnings in the Portuguese balance of payments after 1891 has been pointed out by Cordeiro (1896, p. 400), Vieira (1905, p. 473) and Salazar (1916, pp. 193-99).

from Africa earned foreign currency to the Metropolis, was that Portugal paid to the colonies in the domestic currency, and retained the revenue in foreign currency. Moreover, direct trade between Portugal and its African territories was also carried in the domestic currency and consequently Portuguese exports to Africa did not earn foreign currency. We have not engaged in a detailed analysis of colonial finances in order to ascertain what were the mechanisms of payments between Portugal, the colonies and the rest of the world. For instance, the persistent deficit of the colonial public sector meant an additional inflationary pressure to the Metropolis which could counterweight to an unknown extent the benefits derived from reexports.[1] Although quoting a public servant does not substitute for further research on the matter, it is indicative that, according to the Minister of the Navy and the Colonies, reexports provided

> "an important help (...) during the worst period of the financial crisis, attenuating the need to export gold to balance our financial commitments in foreign capital markets."[2]

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1. It should be noted, though, that government expenditure with the colonies accounted for around 3-8% of total expenditure (the average for 21 years in the period 1883-1914 is 4%). See Mata (1985, p. 133).

2. Vilaça (1899, p. 5). ["o importante auxílio que tal facto veio trazer-nos durante o período mais agudo da crise financeira, atenuando a necessidade de exportação de oiro para saldar os nossos encargos nas praças estrangeiras."] This author also considers "unfair" to evaluate the importance of the colonies to the Portuguese economy only by the fact that colonial public finances were in deficit (idem, p. 7).

Portugal's total merchandise trade balance in foreign currency can be defined as follows:

Credits	Exports from Portugal to foreign countries - Exports from Portugal to the colonies + Reexports from the colonies to foreign countries
Debits	Imports into Portugal from foreign countries - Imports into Portugal from the colonies + Reexports from foreign countries to the colonies

Total reexports and in particular reexports from Africa increased four times from the mid-1880s. In 1910 reexports from Africa which comprised essentially cocoa, wild rubber and coffee, represented about 3/4 of total reexports. Nonetheless, as happened with the other items of the foreign trade statistics, the official data has to be checked. No attempt was made to estimate specific correction coefficients for the reexport trade, but a test to check whether reexports after 1891 were registered at par or at market exchange rates is presented below. It is recalled that, in contrast to imports, exports were recorded by the official statistics at par exchange rates, and thus undervalued in most of the period from 1891 to 1913. As such, we can hypothesize that reexports *from* the colonies were incorrectly recorded, but reexports *into* the colonies were correctly registered. A simple test is to compute the correlation coefficients of the different trade series with an index for the fluctuations in the exchange rate. If the correlation coefficient is significant and has the correct sign, then we conclude that

the series is correctly valued at the market exchange rate. If the series is not correlated with the index for the exchange rate, we conclude that the series was valued at the par rate. The results are the following:

Simple correlation coefficient with the exchange rate index (1890-1913)

	Official data	Revised data
Credits		
Exports from Portugal to foreign countries	0.037	0.547
Exports from Portugal to Africa	0.155	0.424
Reexports from Africa to foreign countries	- 0.106	0.181
Debits		
Imports into Portugal from foreign countries	- 0.298	- 0.340
Imports into Portugal from Africa	- 0.314	n.a.
Reexports from foreign countries to Africa	- 0.385	- 0.098

Despite its simplicity the test is conclusive. We may see that the correlation coefficients of the official data for both total exports and exports to Africa, and the exchange rate index are considerably lower than those from the revised series. On the other hand, according to the official data, reexports from Africa are negatively correlated to the exchange rate, whereas the revised series gives a correct positive sign for the correlation coefficient. On the side of the debits, we note that, as happens with total imports, reexports from foreign countries to the African colonies given by the official statistics are negatively correlated with the exchange rate, as we should expect. In conclusion, outward trade, both direct and indirect, is recorded at the par exchange rate in official statistics; inward trade, both direct and indirect, is recorded at the market exchange

rates. The reexport figures were accordingly corrected.[1]

Table 4.5

Average Trade Balances (contos)

	Direct trade			Colonial Reexports	Total balance in foreign currency	
	Total	Africa	Others			% of Imp.
	(1)	(2)	(3)	(4)	(5)	(6)
1865/1869	-12 175	- 166	-12 008	12	-11 997	- 42.9%
1870/1874	- 4 237	30	- 4 268	551	- 3 717	- 18.2%
1875/1879	- 6 219	376	- 6 594	695	- 5 900	- 18.7%
1880/1884	6 613	na	na	na	na	
1885/1889	- 2 786	446	- 5 254	2 201	- 3 053	- 8.2%
1890/1894	2 653	1 826	827	5 614	6 441	18.6%
1895/1899	16 213	6 727	9 486	13 182	22 668	57.9%
1900/1904	- 1 163	6 599	- 7 763	15 563	7 800	14.2%
1905/1909	-14 575	4 981	-19 555	13 721	- 5 834	- 9.8%
1910/1913	- 8 115	7 204	-15 318	21 445	6 127	8.3%

(1) Total exports minus total imports
(2) Exports to the African colonies minus imports from the African colonies
(3) Exports to foreign countries minus imports from foreign countries [(3)=(1)-(2)]
(4) Reexports from the African colonies to foreign countries minus reexports from foreign countries to the African colonies.
(5) = (3) + (4)
(6) = (5) / total import values
Notes: Trade in column (2) is carried in Portuguese currency, whereas in columns (3) and (4) are it is carried in foreign currency. All values in Portuguese currency.
Sources: Computed from appendix C.

1. See appendix B.

But let us go back to the analysis of the contribution of reexports to the balance of trade in foreign currency. Table 4.5 depicts the deficits of total direct merchandise trade in every five years period from 1865/1869, with the exception of the 1890s. Yet, an increasing share of export revenues was earned in domestic currency, corresponding to the sales to the African colonies. As such, the deficits of *direct* trade in foreign exchange (column 3) were considerably higher, and the surpluses were considerably lower. Taking into account the foreign currency earned by reexports from the colonies, however, the picture changes considerably. After 1890/1894, the foreign currency earned by exports and reexports from Portugal and its colonies was more than enough to pay for imports except in the years 1905/1909. The total trade deficit in foreign currency represented in 1905/1909 only 9.8% of total imports, and in 1865/1869, for instance, it represented 42.9%. The real importance of the colonies for the Portuguese economy is revealed by these figures.[1] After the 1890s, reexports accounted for a larger share of total inward trade into Portugal, compared to the

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1. Despite the attention paid by contemporaries, the importance of reexport earnings has been seldom recognized by historians. An exception is Clarence-Smith (1985, p. 87). However, based on the official data, this author concludes that reexports covered less than half of the deficit between 1905 and 1915, the rest being covered by emigrant remittances. The revision of the official data gives a quite different picture, and we have to conclude that either emigrant remittances were substantially lower, or that they injected money in the economy. For an equivalent role of India and China in the case of Britain see Saul (1960, pp. 62-63) and Latham (1978, pp. 68-72).

United Kingdom, as well as to France:

The Relative Importance of Reexports(*)

Periods	Portugal	United Kingdom	France
1861-1870	9.4%	17.2%	3.2%
1871-1880	9.7%	15.5%	1.2%
1881-1890	11.6%	15.9%	1.2%
1891-1900	21.3%	13.6%	1.4%
1901-1913	21.1%	13.9%	1.4%

(*) Reexports/(reexports+imports)
Sources: appendix C, Imlah (1958, p. 170) and Lévy-Leboyer (1973, p. 86).

The most important conclusion to retain from this section is that the long-run demand for imports in Portugal was met by successive alternative sources of foreign revenue. With varying degrees of importance throughout the period, export revenues, emigrant remittances (as well as capital imports), and reexports from Africa provided the revenue to pay for imports. Emigrant remittances and capital imports were probably more important until the late 1880s, whereas the capacity to import provided by exports increased up to 1897. The difficulties that could have been felt by the contraction in these two sources of foreign revenue were avoided by the rapid increase of the earnings from reexports of African goods after the mid-1880s. The only serious break in imports was in the years 1889-1891 but it was short lived and import growth resumed rapidly afterwards. As we shall see in the next section, this break affected differently imports of industrial inputs and other goods.

4.3 - Changes in the composition of imports

The most striking feature revealed by the analysis of disaggregated data for imports is the difference between import trends of inputs for industrial use, that is raw materials and intermediate goods, and imports of foodstuffs and of manufactures. Imports were disaggregated in four major classes according to their presumed final use.[1] The curves for the four aggregates are shown in graph 4.4. Imports of raw materials and intermediate goods depict relatively smooth trends, in accordance to what has been found for industrial growth as mentioned in chapter 2.

In contrast to imports of industrial inputs, imports of manufactures had sharp fluctuations, which increased in two waves, from 1865 to 1875, and from 1875 to 1890, falling thereafter. The sharp drop in 1890-1892 was followed by a period of rather steep increase. Imports of textile goods were the major cause of the increase in manufactured imports until the peak in

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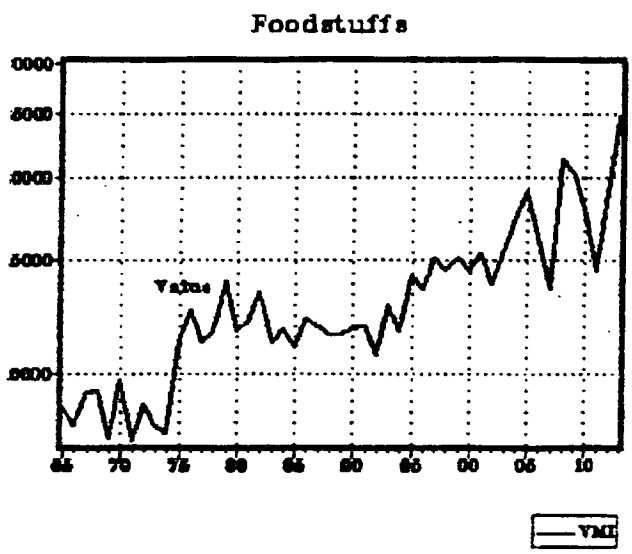
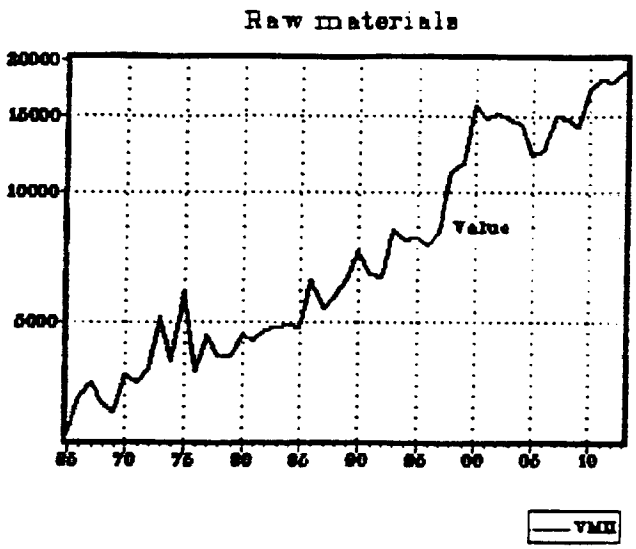
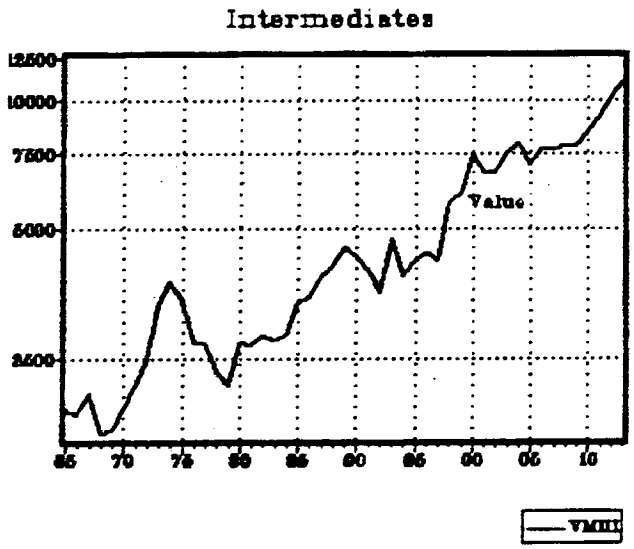
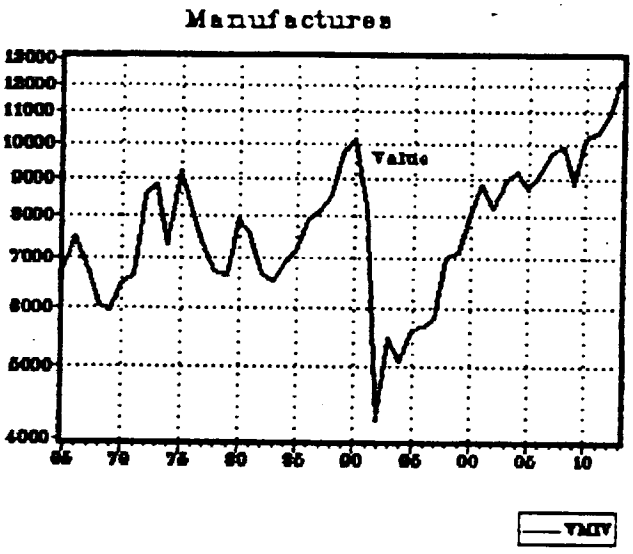
1. These two classification overlap, except for the case of butter (a foodstuff with a high degree of transformation) and presumably kerosene for lightning (a consumer's good with a presumed low degree of transformation). The class of manufactures is an hybrid of consumer and capital goods, yet the only two items of this class that are clearly capital goods are industrial tools and machinery and railway equipment, which accounted for a small albeit increasing share of imports of manufactures. See below.

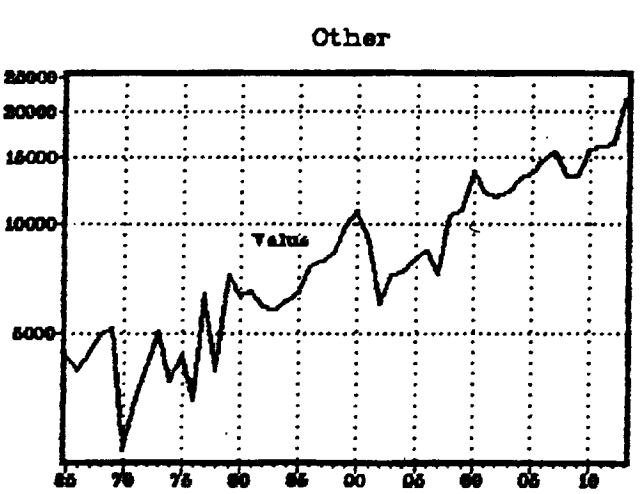
Graph 4.4 - Imports by classes of goods











the mid-1870s. During the 1870s and the 1880s, imports of metal manufactures, industrial tools and machinery, as well as railway equipment accounted for most of the increase in this class of imports. It may be extemporaneous to draw any conclusions regarding fluctuations in industrial investment from the observation of trends in imports of industrial tools and machinery, the larger single class of investment goods that is discriminated in the trade statistics, because of the low amounts involved.

Except for railway equipment, all the items in the class of manufactures peaked in 1889. Between 1889 and 1892 total manufactured imports declined by 58%, accounting for circa one half of the total decrease in imports in the same span of years. The decrease in manufactured imports in these years was concentrated in the following products: cottons, woollens, silks, paper, metals and railway equipment. Machinery imports also declined after 1890 although to a much lesser extent. The other class that fell sharply in these years was the residual class which is largely composed (to an undetermined extent) by manufactures. The decrease in these two classes accounted for about 80% of the decrease in total imports. Thus we may conclude that the difficulties felt in Portugal's balance of payments as a consequence of the reduction in emigrant remittances and capital imports, referred to in the previous section, affected almost exclusively imports of manufactured goods.

As far as imports of foodstuffs are concerned, we may note

three different cycles. A first period of rapid growth until 1879, which is followed by a period with a relatively flat trend, from 1880 until mid-1890s, and then again by a period of raising imports. The increase of foodstuffs imports between 1842 and 1865 was caused mainly by wheat imports, which took place in spite of the regime of protection of cereals, abandoned in 1865.[1] Prior to that year, cereals were imported under special legislation when necessary, showing that domestic supply was insufficient even under protection. The sharp fluctuations in the imports of foodstuffs from 1895 onwards were caused by the irregular path of imports of wheat. Wheat production was under a protective regime established in 1889, and reinforced in 1899, of which trade tariffs were only a small part. This regime fixed a minimum guarantee price for domestic wheat, at which producers could sell all their output through a state central market. Only after that could imports of wheat take place.[2] Such a regime - that can be identified as a regime of yearly fixed quotas - may well explain the sharp fluctuations of wheat and corn imports. Wheat imports were drastically reduced when domestic output was abundant, as happened in 1902 and in 1911. In the years of bad crops, imports could increase in correspondence to the needs of domestic demand.

There are no common patterns for import growth among the

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1. According to Cabral (1979, p.29) the major distinctive element of the Regeneração period was free trade in corn, which lasted *de facto* from 1854 to 1889.

2. For an analysis of the protectionist regime for wheat see Reis (1979).

other goods included in the class of foodstuffs, because they are of an heterogeneous kind and thus responding to different phenomena. Imports of colonial goods such as tobacco, coffee and sugar have their own waves. In the case of coffee, for instance, those waves are intimately related to fluctuations in import prices, showing a high price elasticity of coffee imports. The decline in the imports of butter after 1890 is quite dramatic, and followed the path of imports of manufactures. Also in this case there was import substitution.

In the case of raw and manufactured tobacco and sugar there was no place for import substitution because production was prohibited in Portugal to protect colonial output - a policy that can be considered as one of the costs of the colonies. This was so in spite of the good natural conditions for the production of tobacco in the Douro region, as demonstrated by the experiments that took place during the 1880s, by the time of the phylloxera crisis, and in spite of the advantages for the increase in soil productivity brought by the sugar beet, the production of which was increasing throughout Europe.[1]

Imports of inputs for industrial use, both of raw materials and intermediate goods, registered two absolute peaks in 1873-1875 and 1900. These peaks were to a large extent dominated by

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1. See Pereira (1983, pp. 138-41) and Santos (1974, pp. 199-203) for the case of tobaccos. Regarding the sugar beet, see Campos (1913, pp. 410-25) and Andrade (1918, p.177), who noted that Portugal was the only country in Europe where the plant was not grown. The importance of sugar beet for the European agriculture is largely recognized. See for instance the many references in Milward and Saul (1977).

imports of coal and coke. However, as opposed to what happened in 1875, the steep rise in the value of imports of coal from 1897-1900 was due to the anomalous increase of import prices as a consequence of the British wars in Asia and Transvaal.[1] And in terms of volumes, coal imports increased at a smooth path after 1875. The other major raw material purchased abroad was cotton the volume of which increased constantly and also without major fluctuations up to 1900. Probably by the turn of the century the cotton industry, which developed by catering for the protected domestic and colonial markets, reached a saturation level.

Imports of raw materials for the woollen, linen and silk industries can be read in a less clear cut way than those for cottons because they were but a part of domestic consumption, and could be substituted for by domestic output. Imports of raw silk, for instance, followed up to 1871 the increase of domestic silk production. Pereira (1983) refers to a spurt in the plantation of mulberry trees and raising of silkworms in the period from 1852 to 1876.[2] Domestic output of raw silk was however partially exported. In the case of raw wool, purchases from abroad also coexisted with exports. The reason for this lies in the different quality of the goods, the domestic output being of lower quality and thus probably not fit for some industrial uses.

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1. See Vieira (1905, p. 446) and Benson (1982).

2. See Pery (1875, pp. 150-52), Pereira (1983, pp. 119-26), and Justino (1988, 68-71).

Although the conclusions drawn from this fact should not be pushed too far, given the magnitude of the trades involved, it should be noted that the production of lower quality agricultural goods for industrial use may have rendered difficult the integration between the agricultural and industrial sectors, and the development of industrial sectors based on domestic raw materials.[1] In any case, the analysis of imports of raw textiles other than cotton does not help much in characterising Portugal's industrialization.

Most of the intermediate products imported into Portugal also had domestic substitutes, in particular textile yarns, leather, and timber. As such, it is difficult to draw any conclusions from their fluctuations either. However, we may note the similarity of fluctuations of the aggregate curve of intermediate imports and that of raw material imports. The peak in 1875 was shaped by imports of iron and, to a lesser extent, by timber. During the two decades prior to the war, the major increases in intermediate goods were due to iron, chemicals and tin plate. Tin plate was imported for the canned fish industry, an export industry that boomed from the 1880s onwards. Between 1880/84 and 1910/13 exports of canned fish increased 16.5 times, from 258 contos to 4,266 contos, which implied an increase of imports of tin-plate of 1,352 contos, showing the high import content of this particular export industry.

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1. See the discussion of this point in chapter 2.

Table 4.6 depicts the changes in the structure of Portuguese imports. The major structural change is the sharp relative decline of the share of manufactured goods after the 1890s, which had already started by mid-century. The decreasing share of manufactures is associated with increasing shares of raw materials, indicating that manufactured imports were being substituted for by domestic industrial output.[1] These changes in the composition of imports show clearly that industrial growth after 1890 was of a different kind of industrial growth of the previous period. The changes in the other categories set out in the same table were not as dramatic. The share of intermediate products increased slightly from the 1860s onwards, first recovering and then surpassing the higher shares in the first decades of the period. The weight of foodstuffs increased until the 1870s, and decreased thereafter. Lastly, the residual share was also relatively constant, particularly after 1880/89.

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1. The fact that a small but increasing part of the class of manufactures is composed of capital goods, the import substitution effect described in the text is underestimated.

Table 4.6 - Composition of Imports (%)

	1840/49	1850/59	1860/69	1870/79	1880/89	1890/99	1900/09	1905/14
Live animals	0.7	1.7	3.3	3.6	3.1	4.3	5.2	3.8
Butter	3.4	2.7	2.0	1.9	1.6	0.6	0.0	0.0
Cod-fish	7.5	5.9	5.0	4.6	4.6	4.7	5.7	5.8
Corn	0.8	7.0	8.6	11.8	13.6	12.4	7.3	8.6
Rice	2.3	1.9	1.6	1.7	1.8	1.9	2.4	2.5
Sugar	5.9	8.2	8.0	6.8	5.2	4.8	4.0	3.9
Coffee and tea	2.3	3.2	2.8	2.6	2.0	2.1	1.6	1.4
Tobacco	1.0	0.8	2.4	2.2	1.7	1.3	1.2	1.3
Foodstuffs and tobacco	**24.0**	**31.4**	**33.7**	**35.2**	**33.7**	**32.1**	**27.4**	**27.3**
Raw cotton	0.8	2.0	2.3	1.9	2.7	6.1	6.7	6.9
Raw wool	0.2	0.6	1.2	2.1	2.4	2.9	2.1	1.8
Raw silk	1.2	1.3	1.1	0.7	0.3	0.3	0.3	0.3
Raw flax and hemp	5.3	2.8	2.2	1.8	0.9	0.8	0.6	0.5
Raw hides and skins	3.2	2.1	1.7	2.4	1.9	1.9	2.0	1.8
Oil seeds	0.0	0.4	0.4	0.2	0.3	1.1	1.8	2.0
Chemical fertilisers	0.0	0.0	0.0	0.0	0.1	0.3	1.6	1.9
Dyestuffs	0.9	1.2	0.7	0.9	1.0	1.0	0.9	0.8
Sulphur	0.1	0.1	0.6	0.5	1.1	0.7	0.5	0.4
Coal and coke	1.2	2.2	2.6	4.3	4.3	5.2	7.0	6.3
Raw materials	**11.6**	**11.4**	**11.8**	**14.1**	**14.7**	**20.0**	**23.2**	**22.4**
Textile yarns	2.2	1.5	0.9	1.1	1.1	1.6	1.4	1.3
Leather	0.4	0.3	0.5	0.5	0.7	0.7	1.0	1.2
Cement	0.0	0.0	0.1	0.1	0.3	0.3	0.3	0.3
Chemical products	0.7	0.9	0.7	0.9	0.8	1.3	2.0	2.0
Timber	3.2	2.8	2.0	2.5	2.9	3.0	2.8	2.6
Cast iron and steel	4.0	4.1	2.9	3.4	2.7	3.0	3.1	3.2
Copper,brass,tin plates	0.8	1.1	0.6	0.8	0.9	1.1	1.7	2.0
Intermediate goods	**11.3**	**10.8**	**7.7**	**9.1**	**9.2**	**10.7**	**12.1**	**12.1**
Cottons	26.2	18.8	15.7	12.5	8.7	5.3	4.5	4.5
Woollens	7.7	6.2	5.6	5.7	4.4	2.4	1.7	1.3
Silks	0.6	1.9	1.8	2.2	2.4	1.8	1.5	1.5
Kerosene	0.0	0.0	0.6	0.9	0.8	1.3	0.9	0.7
Paper	0.2	0.1	0.3	0.5	0.6	0.5	0.3	0.3
Metal manufactures	1.9	1.5	0.9	1.0	1.2	1.1	1.5	1.6
Ind. tools and machinery	0.5	0.9	0.7	1.6	1.7	2.4	3.2	3.5
Railway equipment	0.0	0.0	0.5	1.4	2.2	1.1	1.2	1.3
Manufactures	**36.9**	**29.3**	**25.8**	**25.3**	**21.4**	**14.6**	**15.4**	**14.0**
Other	16.2	17.1	21.0	16.3	21.0	22.6	21.9	24.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Until 1865 data includes only: 1842, 1843, 1848, 1851, 1855, 1856, and 1861

Sources: Computed from appendix C.

With the help of the foreign trade statistics we can describe the process of import substitution for the case of the cotton industry, in order to illustrate the limited effect import substitution could have had for industrial growth in general. Table 4.7 compares imports of raw cotton to imports of cotton yarn and manufactures and exports of cotton manufactures (exports of cotton yarn were negligible). Between 1885/89 and 1910/13 the quantity of raw cotton imported increased by 12,372 tons, and imports of cotton goods declined by 3,023 tons. If we assume that there are no significant losses of weight from the raw material to the final output, then import substitution could have accounted for a minimum of 24% of the increase in total cotton output. In the case of yarn, import substitution might have accounted for the check of the rising trend of its imports observed from 1865/1869. On the other hand, the large spurt of exports of cotton goods to the colonies, which amounted to an increase of 2,000 tons, accounted for 16% of the increase in the domestic production. Not surprisingly the largest contribution came from the expansion of the domestic market, accounting for 60% of the total increase of cotton output. These estimates, approximate as they are, give nevertheless an indication of the importance of the phenomena. After all, import substitution and the increased protection of the colonial markets accounted for less than one half of the increase in cotton output in the two

decades prior to the war.[1] It should be recalled that the benefits of the increase of output leaked away in the proportion of inputs that had to be imported. In fact, for each 1$000 exported to Africa, it was necessary to import on average $300 of raw cotton. This is compatible with an estimated domestic value added of cotton production of circa 50%, if we take into account that cotton production also depended on imported coal.[2] Moreover, as previously noted in chapter 2, this import substitution effect was sudden but a finite one. By 1900 the domestic and colonial markets for the coarser kinds of cottons were already glutted with the domestically produced goods.

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1. For further discussion of this see Pereira (1983, p. 278) and Cabral (1979, p. 148).

2. Vieira (1905) gives an interesting analysis of the consequences of the 1892 tariff in terms of import substitution in cottons and woollens. In the case of cottons our conclusions agrees with his, although he does not correct export statistics for undervaluation, even if admitting it to be around 30%. For the case of woollens the author concludes that import substitution was negligible. See Vieira (1905, pp. 428n and 441-44). See also Reis (1986).

Table 4.7

Trade in Cottons

	Imports						Exports	
	Raw cotton		Yarn		Cottons		Cottons	
Years	Value	Volume	Value	Volume	Value	Volume	Value	Volume
1865/1869	593	1331	193	160	3979	3796	314	216
1870/1874	538	1823	248	280	4067	4938	350	336
1875/1879	598	2398	218	296	3271	5819	332	361
1880/1884	847	3548	223	268	3073	5366	111	107
1885/1889	1050	5151	293	359	3009	5738	133	91
1890/1894	2023	8857	292	314	2083	3120	574	455
1895/1899	2910	13425	403	340	2216	2837	3412	2545
1900/1904	4202	14681	433	311	2640	2665	2670	2166
1905/1909	3975	15292	393	330	2777	2472	2066	2116
1910/1913	5668	17523	265	239	3520	2715	2600	2091

Notes: Values in contos and volumes in tons. Export values were corrected by the average correction coefficient.
Sources: Computed from appendix C.

Changes in the composition of imports are reflected in import trends disaggregated by countries. Thus imports from Portugal's major suppliers of manufactures, the United Kingdom, France and three northern European countries followed closely the curve of total manufactures imports, peaking in the mid-1870s and in 1890, and with a sharp fall after this year. Imports from Germany, Belgium and the Netherlands increased at a very quick pace. Imports from these three countries are taken in aggregate to take into account the deficient record of country origin in the statistics. In certain periods, particularly in the earlier years, imports from Belgium, for instance, could have come through the Netherlands. By the same token, some German goods could have been imported trough France and thus registered as

goods of French origin. For this reasons we should take into account that the increasing importance of such countries as Belgium and Germany could be overvalued by the official statistics.[1] In any case, whereas by mid-century most manufactures were purchased from Britain as well as from France, at the outbreak of the war, Germany and Belgium were supplying about the same value of manufactured goods as Britain. Britain was Portugal's major supplier of coal, and coal accounts for the increase of imports from that country after 1897.

Table 4.8

Distribution of Imports (%)

	1840/49	1850/59	1860/69	1870/79	1880/89	1890/99	1900/09	1905/14
United Kingdom	59.5	55.4	46.0	44.0	34.6	30.0	29.3	28.3
Spain	2.2	5.0	8.4	7.9	6.2	8.1	8.2	6.3
France	3.7	8.0	13.0	14.4	13.2	10.7	9.7	9.2
Italy (a)	2.1	1.0	0.5	0.5	1.6	1.7	1.8	1.8
Germany (a)	2.5	2.4	1.2	2.8	10.5	13.0	16.2	16.4
Belgium	0.1	0.2	0.1	1.4	3.4	3.7	3.9	4.3
The Netherlands	1.4	0.9	1.1	1.4	1.0	0.8	1.4	1.9
Sweden and Norway	2.6	2.1	2.1	2.7	2.5	2.8	2.6	3.2
Russia	5.0	1.5	4.9	2.5	1.6	2.4	1.8	1.8
U.S.A.	2.4	3.4	3.1	7.7	14.1	14.8	9.8	10.0
Brazil	14.9	14.6	12.3	8.9	5.9	4.9	3.5	2.4
African colonies	0.5	1.9	2.5	2.4	2.0	2.4	2.9	3.3
Other	3.1	3.6	4.7	3.2	3.4	4.7	8.9	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) Borders as in 1871.

Sources: Computed from appendix C.

1. These country statistics are of no help to correct for these errors, because they also did not always recorded correctly the countries of destination of their exports. For more details see appendix B.

Imports from the other countries have their own specific trends. It should be recalled that the official data for imports from Spain are quite misleading, particularly at the beginning and at the end of the period here analysed. Spain was a major supplier of cereals during the 1840s and 1850s, but some of that trade was smuggled and thus not recorded. As such, imports from Spain in those years are probably undervalued. Smuggling of British cotton goods from Portugal went in the opposite direction. Until the passing of the Spanish tariff of 1869, some imports of cotton goods into Portugal were ultimately directed to Spain. A British consul in Cadiz estimates that that form of smuggling accounted for up to 20% of total imports of cottons into Portugal.[1] The amounts involved were so large that they inspired the following words of a British secretary at the Lisbon embassy:

> "The legal trade on the land frontier may be said to be extinct. There are thirty custom-houses, and a large staff of officials at each of them employed in collecting the revenues. Yet the whole revenue collected by them in 1857-1858 was only £ 6,109, a sum hardly sufficient to maintain the establishments themselves."[2]

Following the treaty signed between Portugal and Spain in 1894,

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1. See Prados (1984, pp. 129-30). In Negócios Externos (1885, II; 1886, I; 1893, III) there are several references to smuggling between the two countries, but no attempt to quantify it. For the opinions of contemporaries regarding smuggling from Spain see also Justino (1988, pp. 213-22). See also appendix B. Pinheiro (1986, pp. 54-62) provides an analysis of Portuguese-Spanish trade, but the importance of smuggling is not quantified.

2. Parliamentary Papers (1860, p. 387).

the transit of animals between the two countries was registered as direct trade because live animals ceased to pay duties in both countries. Consequently the increase in imports from Spain after that year shown by the statistics is highly inflated.

Finally mention should be made of the decreasing importance of Brazil, which from the second largest supplier of imports shifted to a less important position; and the increasing importance of the African colonies, which however by 1913 accounted only for a very small share of Portuguese imports. The evolutions of these two curves are inversely related because Portuguese imports from Brazil were of the same kind as those imported from Africa namely, sugar, coffee and cacao.[1]

Portugal run trade surpluses with Brazil and Africa for most of the period. These surpluses helped paying the principal deficits with France, Germany, Belgium and the United States. Table 4.9 shows these trade balances together with those of the other major trade partners, according both to Portuguese and foreign trade statistics. As has been referred previously,

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1. This was evident since the earlier times of the "third Portuguese empire". From the 1850s there was already the notion that Africa had the potential to supply the tropical goods that Portugal purchased from Brazil. See Clarence-Smith (1985, pp. 65-67). This author gives a comprehensive analysis of trade relations between Portugal and Africa. In agreement with Alexandre (1979), he argues that Portugal's interest for Africa was also economic.
On trade between Portugal and Brazil for 1900-1914, see also Salgado (1927). By comparing trade statistics of the two countries, Salgado (1927, p. 38) concludes that Portuguese exports to Brazil were undervalued (as we also show in appendix B). However, contrarily to what he infers, that does not mean that Brazil's share is also undervalued because the error in the statistics is general.

Portuguese official trade statistics give misleading information on trade balances after 1891 because of the different criteria with which imports and exports were valued in the domestic currency. As such it is necessary to compare these official values with the correspondent values from foreign statistics.[1] However, even these countries' statistics raise difficulties. For example the United States' customs recorded the origin of imports as the country of the last port of shipment. Thus reexports of African goods from Portugal were taken as imports from Portugal proper. The consequence of this is a more favourable trade balance for Portugal registered in the American statistics after the burst of African reexports, as shown in the same table. The lack of regular shipping routes between Portugal and the United States led trade to be carried indirectly and the fact that trade was badly recorded was only a minor consequence of that. The following words of the American consul in Lisbon illustrate how trade could be hindered for lack of communications, although we have to take into account that lack of regular transport could also be the result of lack of a minimum flow of trade to feed it:

> "The great drawback to trade between Portugal and the United States is the lack of regular communications. During the year 1880, 147 vessels arrived in Lisbon from the United States, but most of these vessels were chartered for full cargoes, and it is rare for a vessel to be put on for general cargo. The result is that many articles are imported via England at an increased expense, as well as being generally classed in

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1. Portuguese official trade statistics were corrected precisely by comparing them with foreign trade statistics (see appendix B).

the custom-house returns as being of English origin."[1]

Because of problems of this kind, table 4.8 has to be read carefully. However, there is an important finding shown in that table, which is that Portugal had a positive balance of trade with Britain throughout the second half of the nineteenth century.[2] Only from the beginning of the twentieth century onwards did the balance turn negative. The basis of that surplus was of course port wine exports. Apart from Britain, Portugal's balance of trade with the other European countries was generally negative, the major exception being the balance with France during the wine export boom in the 1880s.

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1. Commercial Relations (1881).

2. A feature that, according to Milward (1981, p. 59), was common to other "developing economies" of Europe.

Table 4.9

Trade Balances (contos)

	U.K.		France		Belgium		Germany	
	Por.	For.	Por.	For.	Por.	For.	Por.	For.
1865/69	94	104	-548	-593	26	36	-19	na
1870/74	862	900	-403	-159	42	22	-20	na
1875/79	457	658	-814	-529	-112	-89	-72	na
1880/84	824	948	-59	13	-134	-116	-352	na
1885/89	-727	192	333	1023	-205	-317	-580	na
1890/94	-533	487	-615	-462	-179	-330	-402	-40
1895/99	-419	582	-492	-188	-137	-97	-567	43
1900/04	-1528	-103	-763	-446	-254	-224	-1147	-320
1905/09	-1903	-382	-1063	-615	-261	-152	-1509	-788
1910/13	-2125	-916	-920	-573	-489	111	-1668	-859

	Spain		U.S.		Brazil		African col.	
	Por.	For.	Por.	For.	Por.	For.	Por.	For.
1865/69	-110	-1843	-136	-120	70	na	-175	na
1870/74	-46	-138	-242	-209	281	na	-71	na
1875/79	-169	-1006	-627	-615	584	na	144	na
1880/84	-37	-645	-1024	-762	700	na	-57	na
1885/89	-250	-829	-892	-602	576	na	-21	na
1890/94	-267	39	-969	-582	819	na	768	na
1895/99	-17	-210	-906	-187	777	na	2803	na
1900/04	70	55	-947	-33	533	1368	2968	na
1905/09	174	215	-1043	655	870	1865	2672	na
1910/13	246	51	-1284	707	1083	2635	2710	na

Notes: "Por." and "For." stand respectively for Portuguese and foreign sources for export and import values.
Source: Appendixes B and C.

Despite the distortions that the tariff regimes may impose, the fact is that foreign trade patterns are related to a country's comparative advantages. Portugal had comparative advantages in agricultural goods such as wine, and some Mediterranean products. In terms of manufactures, however, the comparative advantages revealed by the export patterns were rather more limited. Cottons and other manufactures like footwear or metal tools were exported to Africa and Brazil largely because they benefited either from tariff protection (in Africa after 1892), or from the preferences of Portuguese emigrants in Brazil. In exchange for wine and sales to Africa and Brazil, Portugal imported manufactured goods and industrial inputs. This pattern is the closest we can find to the pattern of trade within Europe and between Europe and the rest of the world, linking more and less technologically developed countries, through merchandise trade and capital flows. Accordingly, each country imports higher technological content goods from more advanced countries, in exchange for goods with less technological content, and it exports lower grade industrial goods to less developed areas, in exchange for primary products. The Mediterranean countries, for example, imported cotton and linen yarn from Britain, but their imports of either wool yarn or piece goods were practically non-existent, because these are more labour intensive goods. Instead, Britain exported piece goods to less developed countries outside Europe. On the other hand, France, Belgium, Germany and

Switzerland - the major importers of textile yarn, as well as pig and bar iron and machinery sold by Britain - exported to Austria, Poland, Italy and Russia lower technological content goods. Austria and Italy had the same specialization towards Hungary and the Balkans. Italy sold low quality textiles, mainly silks, to the Balkans and to Latin America.[1] Industrialized countries such as France and Britain also exchanged between them goods according to their resources endowments: Britain sold coal, wool, iron, copper and semi-finished woollens to France and bought in exchange silk, leather and cotton manufactures, wine, spirits, refined sugar and flour.[2] Portugal participated in this complex net of world trade in the particular position given by its imperial status.[3]

Portuguese trade with Africa and Brazil has to be read in the light of these general patterns of bi-directional trade. Portugal exported manufactures to the less developed areas closest to its position at the edge of Europe and made accessible by its past or present Empire. Such pattern of specialization had

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1. See Pollard (1982, pp. 174-84 and 225). Pollard also mentions a similar pattern of specialization between the Western and Eastern parts of the German Empire. See also for Austria, Eddie (1989, pp. 827-28), and for Italy, Federico (1987, p. 12) and Fenoaltea (1968, p. 417).

2. See O'Brien and Keyder (1978, p. 162). Intra-industry trade did not have in the nineteenth century the importance that it achieved after 1945. The economic literature on the determinants of the commodity composition of trade, that is, regarding the discussion of the Heckscher-Ohlin-Samuelson theorem, is rather wide. See for a survey, Tharakan (1985).

3. See the best description of this "pattern of settlements" by Saul (1960, chap. 3).

evident political causes. And in this sense we may agree with Wallerstein's classification of Portugal as a country belonging to the *semi-periphery* of the *world economy*, if it is taken into account that, according to this author, semi-periphery is a concept that does not refer to an economic process, but to a "political choice". Following Wallerstein, a given country assumes a semi-peripheral position because of deliberate policy action towards shifting resources in a "core-like" direction. However, when Portugal's trade is seen in the context of the patterns found for other countries from the geographical periphery of Europe, one is led to conclude that economic factors (related to the structure of the Portuguese economy) were also in action because, as was pointed out above, similar patterns were common to other late-comers that did not have colonies.[1]

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1. It should be noted that Wallerstein's typology is of limited use because it is not fully consistent. In fact, although semi-periphery is defined in terms of political choice (much in the lines of an author discussed in chapter 1, António Sérgio), the related concepts of *centre* and *periphery* are defined in economic terms. See Wallerstein (1985, pp. 34-36). In contradistinction, Schwartzman (1989, pp. 77-82), who follows closely Wallerstein in her analysis of Portugal, argues that the concept of semi-periphery is essentially economical. In a brief review of the concept Federico (1988, pp. 166-667) concludes that the classification criteria is essentially historical rather than "structural". In other words, it is an ex-post concept.

4.4 - The balance of trade and economic growth, 1865-1913

Economists and historians expect import dependence to be a major feature of economic growth of small nations, during the period of growing and comparatively free international trade that lasted from mid-nineteenth century to World War I. If that is the case, economic growth is then constrained by a given country's capacity to pay for imported goods. Consequently, export earnings can be of paramount importance for balanced growth, because of the foreign currency they earn. But export earnings can of course be supplemented and substituted by other sources of financial inflows which may include, as we have seen for the case of Portugal, emigrant remittances (and foreign capital), and revenues from colonial reexports.

The way imports are financed may not be indifferent in terms of their consequences to the economy or in terms of the range of choices of economic policy. If imports are mostly financed by autonomous capital inflows, for instance, the economy will be more affected by fluctuations in world financial markets. On the other hand, if imports are mainly financed by export (or reexport) revenues, the dependence on the international economy changes in nature: now foreign demand for exports and the terms of trade are the main paths of transmission for external fluctuations.

The relative importance of the different sources of foreign

revenue varied throughout time in the case of Portugal. In certain periods, such as that that immediately followed the crisis of the late 1880s, alternative sources of foreign revenue had to be found, because the old ones had broken down. Precisely during the late 1880s and early 1890s, contemporaries were most worried about the country's capacity to equilibrate its balance of payments, as well as its capacity to maintain economic and political independence. Some historians have reproduced these fears, to such an extent that they have unduly concluded that the difficulties felt in the balance of payments by 1890 were translated in a deep and generalised economic crisis.

The analysis carried in this section will show that there were in fact major structural changes in respect to the capacity to finance import growth through exports after 1890. Indeed, after 1890 Portuguese economic growth got more dependent on sources of import financing other than exports. However, these shifts did not affect in any fundamental way the smooth path of economic growth that by that year had already lasted for four decades.

To analyse the constraint imposed by the balance of merchandise trade on economic growth we shall estimate here import and export demand equations. The main objective of these estimates is to obtain income elasticities for the demand of imports into Portugal, and for foreigner demand of Portuguese exports. By comparing these income elasticities we can say something about the extent to which Portugal could depend on

exports to pay for the imports needed for economic growth. This issue is crucial for balanced growth. With constant terms of trade, a country that has an income elasticity for imports higher than the income elasticity for exports, will experience a deterioration in its trade balance, and a pressure on either its gold reserves or its exchange rates. In that case, capital imports and other foreign financial flows can be crucial to sustain economic growth.[1]

To compute the elasticities for Portuguese trade I estimated linear demand functions for imports and exports, according to two different functional forms. The first is a *standard* Keynesian demand function, according to which demand of period t is a function of relative prices and income of the same period; the second is an *extended* version of the first form with a lagged dependent variable which accounts for an adjustment process in demand. The extended form was preferred because, in contrast to what happens with the standard one, the residuals of the regressions are not autocorrelated.[2] As it is discussed in the appendix to this chapter, where the models are described in more detail, autocorrelation of the residuals can be the result of model misspecification. In that case we conclude that the

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1. See Johnson (1958), Houthakker and Magee (1969, p. 111). For a review on this issue see Magee (1975, pp. 201-2) and Goldstein and Khan (1985, pp. 1083-84).

2. The extended equations were also preferred on grounds of consistency. See below.

addition of a lagged dependent variable has increased the specification of the demand functions because it has eliminated the autocorrelation on the residuals. The economic rational beyond the lagged variable is that it depicts the effect of adjustment in demand for imports. Accordingly, the level of imports in period t is conditioned by the level of the previous period, because of the consequent variation in net foreign liabilities. Our previous discussion in this chapter shows that this adjustment process could be particularly relevant for the case of Portugal.[1]

Two major conclusions may be drawn from table 4.10, where the results of the estimates of the two forms for the demand functions are shown (the values for the standard equation are reported in this and the following tables for the sake of comparison). The first conclusion is that demand for exports from and for imports into Portugal are both price inelastic, the respective coefficients not being significantly different from zero. The second conclusion is that the income elasticity for imports is larger than the income elasticity for exports, this differential having increased in the period after 1890.

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1. For further details see the econometric appendix to this chapter. Demand elasticities for imports disaggregated in three classes of goods, using the two models are presented below. According to the standard model, which is also affected by autocorrelation in the residuals, the income elasticity for imports of manufactures turned negative in the 1890-1913 period, what explains to a large extent the reduction of the aggregate elasticity. This is a result hard to accept, giving an additional reason to reject the model.

Table 4.10
Import and Export Demand Elasticities: Portugal

	Import		Export	
	Price	Income	Price	Income
Standard equation				
(1865-1890)	a1	a2	b1	b2
	-0.534	1.374	-0.074	0.790
	(3.60)	(6.26)	(0.40)	(7.12)
(1890-1913)	a1	a2	b1	b2
	0.347	0.786	0.060	0.834
	(0.97)	(2.10)	(0.26)	(7.37)
(1865-1913)	a1	a2	b1	b2
	-0.394	1.117	-0.074	0.727
	(3.92)	(14.46)	((0.79)	(20.32)
Extended equation				
(1865-1890)	c1/k	c2/k	d1/q	d2/q
(k=0.445; q=0.690)	-0.515	1.553	-0.172	0.819
	(1.53)	(2.49)	(0.64)	(2.72)
(1890-1913)	c1/k	c2/k	d1/q	d2/q
(k=0.407; q=0.417)	-0.592	2.260	0.259	0.861
	(0.83)	(2.89)	(0.53)	(2.09)
(1865-1913)	c1/k	c2/k	d1/q	d2/q
(k=0.282; q=0.586)	-0.287	1.174	-0.010	0.730
	(0.93)	(2.54)	(0.70)	(4.11)

Notes:
Standard equation

$$\ln T(t) = a0 + a1.\ln[PT(t)/PA(t)] + a2.\ln A(t) + u(t)$$

$$a1 < 0; \quad a2 > 0$$

Extended equation

$$\ln Tn(t) = c0 + c1.\ln[PT(t)/PA(t)] + c2.\ln A(t) + c3.\ln T(t-1) + u'(t)$$

$$c1 < 0; \quad c2, c3 > 0$$

T stands for imports or exports and A stands for world or domestic activity. t-statistics between brackets. All data converted into indexes (1900=100).
Sources: World activity and world prices: Lewis (1981, pp. 38-59, 62-65); Portugal: appendixes A and C. See regression results summarized in tables 4.13 and 4.14.

The finding that the demand for imports is inelastic with respect to prices is indicative of the fact that Portugal purchased abroad essential consumption goods and raw materials, and that the domestic import competing industries were not enough developed to provide for substitutes.[1] The fact that export demand is inelastic in relation to prices cannot be interpreted in such a clear-cut way. The goods that Portugal exported had close substitutes from many parts of the world. Portugal was also a small exporter in most markets, except for that of raw cork.[2] Thus we could expect a large price elasticity for aggregate export demand. Yet, two sorts of factors may have influenced the elasticity in the other direction. Firstly, some of Portuguese export markets could have certain rigidities. For instance, exports of port wine and corks were tied to British investment in Portugal, whereas exports of canned fish were tied to French investment, and thus probably less responsive to price changes. Another reason could be that Portuguese export prices relative to those of its competitors were on average falling, probably not because of increases in productivity, but because of other factors such as decrease in relative quality standards. Demand could be elastic in relation to increasing prices but not so in relation to decreasing prices. This is also why price

1. This is a classical text-book case of less developed countries. See for instance Sodersten (1980, pp. 319-20).

2. See for instance Costa (1908).

elasticities of the demand for most farm products in high income countries tends to be low.[1]

The differences in income elasticities shown in table 4.10 mean that, given the initial situation of a trade deficit in 1865, the rate of economic growth in Portugal was limited by the capacity to cover an increasing trade deficit, and the growth rate of world imports (world income). In other words, the growth of the Portuguese economy could not differ systematically by a large measure from the growth of world imports unless a deficit in the balance of trade could be maintained either by external financing or by compensation through other items of the balance of payments. In this context, the magnitude of the income elasticity of export demand appears as a crucial constraint of economic growth. At constant terms of trade, and capital imports apart, Portugal could either grow at the same rate as its trading partners, accepting a secular deterioration in its balance of trade, or to opt to external balance and accept a slower growth rate than its partners.[2]

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1. See Schultz (1983, p. 11). For empirical evidence on export price elasticities for the twentieth century see Goldstein and Khan (1985, pp. 1084-85) and Stern (et al.) (1976, pp. 12-26). According to this evidence export price elasticities for primary products are generally smaller than for manufactured goods, and in some cases not significantly different from zero.

For the nineteenth century we have evidence from Nye (1989, pp. 11-15), whose estimates for the demand for French exports are also price inelastic in the 1820-1850 period (-0.5), yet increasing in the following period from 1860-1890 (-1.9). The price elasticity of Spanish exports is also inelastic for the 1850-1913 period (-0.2), according to Prados (1982, p. 31), although not so for the period 1815-1880 (-0.7) according to Prados (1988, p. 186).

2. Goldstein and Khan (1985, pp. 1083-84).

Yet, if the external imbalances are adjusted through changes in prices and capital movements, the constraint of the trade deficit on growth is relaxed. In fact, growth in the case described above leads to a deterioration in a country's balance of payments only if domestic credit creation exceeds the growth in the domestic demand for money. Otherwise, the outflow of money due to the external deficit would reduce domestic money supply, and thus raise interest rates to a new equilibrium, and imports would be reduced via the contraction in investment and, given certain conditions, in consumption. It is generally held in the literature that money creation under the *curso forçado* was largely inflated.[1] However, contemporary authors such as Freitas (1898), Teles (1903), as well as Salazar (1916), argued that money creation after Portugal left the gold standard was not excessive and as such did not affect prices. This is further confirmed by the quantification of the money stock from Reis (1991a).[2]

Although capital imports and other inflows are not strictly necessary to allow for growth when the income elasticity for imports is larger than that for exports, they ease the pressure on the economy by lowering interest rates. This is of course another way of expressing the absorption view of the balance of

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1. See Magee (1975, pp. 201-2).

2. See Freitas (1898, p. 47), Teles (1903, p. 415), Salazar (1916, pp. 156-60) and Reis (1991a).

payments, according to which the observed imbalances are a consequence of a disequilibrium between domestic savings and investment.[1] As the determinants of financial inflows include exogenous variables, economic growth may become more dependent on the conditions of the international capital markets.[2]

It has already been mentioned that emigrant remittances, probably Portugal's main source of foreign revenue, were a major source of instability, as well. As Salazar (1916) has pointed out, after Portugal left the gold standard, remittances had a strong influence on the rate of exchange, as shown by the high correlation of the value of the pound in Lisbon and Rio de Janeiro.[3] This author also points out that part of the fluctuations in remittances and capital imports were due to domestic factors. According to him, capital imports were not as much sensitive to the creditworthiness of the state, as to the level of interest rates, taxes, or the perception of the foreign investors regarding the country's safety and stability. More precisely, Salazar (1916) argues that capital movements were related to changes in the confidence of the foreign creditors derived from certain historical events. According to him, the 1891 financial crisis led capital to leave the country; the

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1. See Alexander (1956).

2. See for a the general case Sodersten (1980, p. 356).

3. The most complete study on this relationship is Salazar (1916, p. 189), although it had been previously recognized by Cordeiro (1896, p. 181) and Teles (1903, pp. 414-15). See also Mata (1984) and Pereira (1983, pp. 260-61).

convention with foreign creditors in 1902 led to the return of capital because confidence would have increased; and finally the dictatorial government of João Franco in 1907 would have again frightened investors.[1] The conclusions we may draw for Portugal on this matter cannot be but tentative because we lack yearly estimates for the balance of payments, and because it is difficult to establish the true causes of changes in capital imports. For instance, the 1902 convention could have been signed because the balance of payments improved (due to better conditions in Brazil, and thus higher remittances), and not the other way round, as Salazar argued.

Under specific conditions, rapid growth, even when it implies an increase in the trade deficit, may generate balance of payments surpluses, and sluggish growth may generate balance of payments deficits, even if it leads to trade surpluses. This was the case with the United States, a net capital importer, as well as Britain, a net capital exporter, during most cycles in the period from 1820 to 1913.[2] During the Italian industrial upsurge of the Giolittian era (1903-1913) a similar process occurred. According to Fenoaltea (1968), that boom benefited from a "sufficient inflow of foreign capital to keep the legal tender at par". In agreement, Federico (1979) argues that the success of these years was precisely due to the capacity to substitute for

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1. See Salazar (1916, pp. 169-71, 174-75).

2. See Williamson (1964, pp. 159-60 and 206). On this "virtuous cycle of growth" see also Caves (1970, pp. 236-43).

diminishing exports, in a period of increasing imports, by importing capital, as had already happened during the previous boom in 1883-1887.[1] These examples illustrate the fact that income elasticities of imports larger than those of exports is a structural feature of the economy that is not negative per se.

The experience of the Scandinavian countries may further illustrate how similar structural features led to different results in general economic performance. Table 4.11 reports the estimates of import demand elasticities for Denmark, Finland and Sweden, together with the United Kingdom, computed in the same way as those for Portugal.[2] For the same reasons as before, the extended form of the demand equation has been preferred.[3] In what Scandinavia is concerned, the first interesting fact is that taking the whole period from 1865 to 1913, income elasticities for each country's imports are larger than the correspondent export elasticities. We may thus conclude that the capacity to finance an increasing deficit of the balance of trade was

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1. See Fenoaltea (1968, p. 418) and Federico (1979, p. 403). This mechanism was of course also active during the short industrial boom in Portugal by mid-1870s, as it has already been pointed out.

2. The case of the United Kingdom is just mentioned as indicative. Given the predominant position of this country in world markets, its elasticities of imports may be compared to those of exports from the other countries. It should be mentioned too that UK's merchandise deficit was covered by net exports of services and interest payments from capital exports. See Imlah (1958).

3. As in these cases the outcome of the standard and extended equations do not have significant differences, those for the standard equation are reported only in the appendix to this chapter.

important not only for Portugal but also for Scandinavia. Table 4.11 also shows estimates for Spain from Prados (1982, 1988) for 1850-1913, and the conclusions for this country are similar.[1] In the context of demand analysis carried out in this section, the initial conditions by 1865 appear as crucial: the larger the trade deficit accumulated in the first half of the century, the worse the conditions of economic growth in those countries. Yet the capacity of each country to borrow on capital markets in order to close the gap is more important.

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1. Prados (1982, p. 31) and (1988, pp. 186-87). For Italy, Glazier et al. (1975) provides estimates for foreign trade demand functions, but only for trade with Britain.

Table 4.11
Import and Export Demand Elasticities:
Selected European Countries

	Import		Export	
	Price	Income	Price	Income
(1865-1890)				
Portugal	-0.515*	1.553	-0.172*	0.819
Denmark	0.283*	2.872	-0.380*	1.187
Finland	1.735*	1.157*	0.945*	0.313*
Sweden	0.150*	2.221	-0.453*	1.263*
United Kingdom	-0.207*	1.614	-0.295*	0.828
(1890-1913)				
Portugal	-0.592*	2.260	0.259*	0.861
Denmark	-0.883*	0.870	-0.870	1.106
Finland	0.791*	1.610	0.276	1.042
Sweden	0.138*	0.867	-1.218	0.945
United Kingdom	0.352*	1.304	-1.267	0.853
(1865-1913)				
Portugal	-0.287*	1.174	-0.010*	0.730
Denmark	-0.059*	1.563	-0.405*	1.206
Finland	1.698	1.439	0.114*	1.111
Sweden	-0.250*	1.355	-0.848	1.204
United Kingdom	0.020*	1.468	-0.920	0.718
Spain (1850-1913)	-1.176	1.478	-0.191*	1.001

Notes:
Elasticities computed as in the previous table, except for Spain which are taken from Prados (1982, p. 31, eq. 2) and (1988, p. 186).
Sources: World activity and world prices: see previous table. **Denmark:** Johansen (1985, pp. 190-98, 217-218, 390-97). **Finland:** Hjerppe (1989, pp. 195-96, 259-61), Vattula (1983, pp. 18, 232, 458). **Sweden:** Johansson (1967, pp. 138-45, 150-61). **United Kingdom:** Mitchell (1975, pp. 818, 826), Imlah (1958, pp. 96-98). All data converted into indexes (1900=100).

In the shorter period from 1890 to 1913 the story for Denmark and Sweden is different from that of Portugal, because their income elasticity demand for exports is larger than that of imports, implying that the growth of income did not lead to an adverse balance of trade. Finland was in the same conditions as Portugal, but it would be interesting to look for the differences in the conditions for Portugal and Finland with respect to the payment of their trade deficits, in particular the rate of interest paid on foreign capital.[1] What is important to stress is that in the two decades after 1890, economic growth in Portugal became more sensitive to the capacity to provide for the means to cover the deficit on the balance of trade, in contrast to Denmark and Sweden.

The factor behind that change was of course import substitution.[2] Table 4.12 shows clearly that the increase of the income elasticity of imports in 1890-1913 was due to the increase of the elasticity of imports of industrial inputs (raw materials and intermediate goods). The income elasticity for imports of manufactures, on the other hand, was slightly reduced. The disaggregation of the import demand schedule reported in table

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1. In 1873 the rate at which the government from Portugal could borrow in London was 6.7%, whereas for Britain and Denmark it was 3%, for Sweden, the Netherlands, Belgium and Germany, it was 4% (Pollard, 1989, pp. 76-77). Of course Portugal was still in a relative advantageous position. The Ottoman Empire, for instance, had to borrow on average at 10-12% throughout 1860-1913. See Pamuk (1987, p. 59).

2. It is recalled that this effect is underestimated by the fact that the class of manufactured goods includes a small but increasing share of capital goods, namely industrial tools and machinery and railway equipment.

4.12 shows additionally that the standard regression does not give consistent results, contrary to the extended regression, further supporting our choice (see the appendix to this chapter).[1]

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1. We have tested the influence of tariffs on imports by estimating a regression in which the domestic price of imports was divided in three components: international import prices expressed in pounds (PM'), the exchange rate (E) and the ad valorem tariff rate (Tariff). The coefficient for tariffs is not statistically significant. The results for the extended equation for 1865-1913 are:

lnM(t) = 4.943 - 0.398 ln[PM'(t)/PY(t)] - 0.868 lnE - 0.490 lnTariff + 0.753lnY(t) + 0.441 lnM(t-1)
(3.12) (2.74) (3.86) (1.36) (4.54) (3.66)

R2 = 0.955; DW = 2.24; SER = 0.07

Absolute t-values between brackets.

PM' and Tariff are computed from Lains (1987). E is from appendix table B.6. The statistical significant elasticities are the following (cf. with appendix to this chapter)

Price elasticity = -0.398/(1-0.441) = -0.711

Income elasticity = 0.753/(1-0.441) = 1.347

Exchange rate elasticity = -0.868/(1-0.441) = -1.553

Table 4.12

Import Demand Elasticities by Sectors: Portugal

Standard Equation

	1865-1890		1890-1913		1865-1913	
Sectors	Price	Income	Price	Income	Price	Income
Foodstuffs	-1.133	0.285	-0.178	0.397	-0.766	0.555
Intermediate goods	-0.235	2.222	-0.002	1.827	-0.269	1.968
Manufactured goods	-0.001	1.471	1.315	-0.455	-0.100	0.277
TOTAL (from tab.4.10)	-0.534	1.374	0.347	0.786	-0.394	1.117

Extended Equation

	1865-1890		1890-1913		1865-1913	
Sectors	Price	Income	Price	Income	Price	Income
Foodstuffs	-1.271	0.031*	-0.470*	0.717*	-0.793	0.520
Intermediate goods	-0.050*	2.547	-0.160*	2.145	-0.200	1.979
Manufactured goods	0.157*	1.908	0.027*	1.641	0.336*	0.496*
TOTAL (from tab.4.10)	-0.515*	1.553	-0.592	2.260	-0.287*	1.174

Notes: Elasticities computed as in the previous table.
Sources: see table 4.10.

The 1890s were difficult years for Portugal because of changes in the international economy, in particular disturbances in the international capital markets. Due to difficulties in the balance of payments, Portugal left the gold standard. This decision brought in turn currency depreciation (see appendix table B.6). This mechanism of adjustment had the ultimate consequence of promoting import substitution, leading to another source of pressure on the balance of payments. Contemporary writers and historians had the clear perception of these problems. Yet, either because they were living the drama and engaged most of the times in politics, or because they were looking into misleading directions, what they could not envisage was that such difficulties could be overcome. We have described in this chapter how problems in the balance of payments were successively solved, to such an extent that the 1891 financial crisis, in the end, was not reflected on the indexes of physical output growth. What is left to be demonstrated is whether the solutions found to solve the balance of payments difficulties were fortuitous or not. The hypothesis that the Portuguese economy was by the 1890s sufficiently "mature" to have the power to overcome such a crisis of development, whatever the circumstances, should be considered too.

Econometric appendix

Elasticities for the demand of Portuguese imports were estimated according to a function defined in agreement with the classical Keynesian formulation in which imports depend on the level of nominal national income, on foreign prices, and on the prices of the competing home produced goods:

(1) $$Mt = f\,(NY(t),\ PM(t),\ PY(t))$$

$$f1 > 0,\quad f2 < 0,\quad f3 > 0$$

where, **M** stands for the volume of imports, **NY** for the value of national income, and **PM** and **PY** denote the respective price indexes in a common currency, and **t** stands for time. Dividing the right-hand side of equation (1) by **PY**, that is, assuming that there is no money illusion, and taking logarithms, we get,

(2) $$\ln M(t) = a0 + a1.\ln[PM(t)/PY(t)] + a2.\ln Y(t) + u(t)$$

$$a1 < 0;\quad a2 > 0$$

where **Y** is the deflated national income, **a0** is the intercept, **a1** and **a2** stand for the import demand elasticities in respect to prices and income, respectively, and **u** is the error term.

By taking equation (2) it is assumed that markets are not fully competitive, that is that imported and home produced goods are not perfect substitutes. This assumption implies that whatever the changes in the relative prices of both domestic and imported goods, neither of them fully dominates the market, an assumption that is true for most goods and certainly for imports

taken in aggregate.[1]

The import demand function was estimated for the years 1865-1913 for which we have a continuous series for import volumes and prices and a proxy for the national income. This proxy is an index for physical output growth presented in the appendix B.[2] All variables are in index form.

The functional form for the export demand function is derived in a similar way. In this case exports are taken as a function of a world economic activity, and export prices relative to world prices. To take into account changes in world income elasticities, I have used a proxy for world imports - an index of world exports - as the world activity variable. The movement in prices, though, may differ given that import prices contain a CIF factor, which had a secular decline from 1865. This is a minor distortion, nevertheless.[3] The equation for export demand is the following:

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1. See Goldstein and Khan (1985, p. 1045). For the "law of one price" to hold for aggregate imports, it would be necessary that imports were totally composed of standardized products.

2. The index for physical output, a composite index of agricultural and industrial growth, is smoothed because the index for agriculture consists of three year non-overlapping averages, and thus it had to be interpolated for the intermediate years. To convert this index into an index of G.N.P. in current prices, I assumed that services evolved at the same pace as physical output, and used Justino (1988-89) price deflator. For more details see appendix A.

3. In terms of volumes the World exports and imports should be equal except for accounting errors.

$$(3) \qquad \ln X(t) = b0 + b1.\ln[PX(t)/PMW(t)] + b2.\ln MW(t) + v$$

$$b1 < 0, \quad b2 > 0$$

where **X** is the volume of Portuguese exports, **MW** is a volume index for world imports and **PX** and **PMW** are the respective prices, in the home currency. Coefficients are read as in equation 2. The results of the estimates for equations (2) and (3) are reported on tables 4.13 and 4.14 below.

The greatest problem of the estimated demand functions is that they present serial correlation of the first order, as shown by the Durbin-Watson statistics. All the other statistics are good, and the signs of the statistically significant coefficients are as expected. The observations we use to estimate demand functions are equilibrium points defined by a demand and a supply schedule. If a single equation model is used, it might happen that the resulting estimates for the elasticities are in fact weighted averages of the true demand and supply elasticities, leading to undervaluation of demand elasticities. According to Orcutt (1950) single equation estimates for demand are valid only when the supply elasticity is infinite.[1] The assumption of infinite supply elasticities is stronger in the case of aggregate export supply, even in the long-run, because exports are drawn from limited domestic resources; while the supply elasticity of aggregate imports (in particular of imports into a small country such as Portugal) is most probably close to infinity, because

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1. See Leamer and Stern (1970, pp. 28-36).

imports are drawn from world resources. Serial correlation may thus be a consequence of a simultaneous equation problem in estimating demand functions.[1]

It is common practice to correct autocorrelation by using the Cohcrane-Orcutt method. This method is however subject to criticism because it imposes a restrictive assumption on the estimates, namely, that the dependent and independent variables in the equation evolve in time through a common factor, and in consequence a common root formulation is valid. Only in that case can the residuals of the estimates be expressed as:

$$z(t) = a.z(t-1) + w(t) \qquad (4)$$

It has been argued by Hendry and Mizon (1978) that the error term autoregression [a.z(t-1)] catches the effects of omitted lagged variables in the regression. In that case, autocorrelation is attributed to dynamic misspecification of the model. Consequently, by adding a lagged variable to the demand functions we can eliminate serial correlation and avoid the simultaneous equation bias.[2] Following Hendry and Mizon's point, it is worth

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1. Orcutt's assumption according to which single-equation estimates undervalue the true elasticities has been contested by Magee (1975, pp. 205-7 and 214-18) who - criticising what he calls the "Orcuttazition of empirical studies" - points out to a series of other factors that may lead to over-valuation of the elasticities estimated from single equation models. In his empirical study based on simultaneous equations estimates, though, Magee found large supply elasticities for both imports and exports (idem, p. 204).

2. In that case, autocorrelation is attributed to dynamic mis-specification of the model. For details regarding this matter see Hendry and Mizon (1978, pp. 550-52). In any case, according to Magee (1975) and in disagreement to Orcutt (1950) it should not be expect that the dynamic model gives higher demand elasticities.

while to try to better specify the functional form for import demand, by adding a lagged variable, and to eliminate the correlation in the residuals, instead of using the more restricted Cochrane-Orcutt method.

The dynamic model I estimated is inspired in Houthakker and Taylor (1970). It assumes that demand has the following adjustment process:

$$(5) \qquad /\backslash \ \ln M(t) = k \cdot [\ln Md(t) - \ln M(t-1)]$$

where **Md(t)** is demand for imports in period t, **M(t-1)** is actual imports in the previous period, **k** is the coefficient of adjustment ($0<k<1$), and $/\backslash$ is a first-difference operator,

$$/\backslash \ \ln M(t) = \ln M(t) - \ln M(t-1)$$

Equation (5) implies that the actual level of imports into a given country adjust to excess demand for imports. If, for instance, imports in period (t-1) lead to an outflow of foreign exchange reserves or gold, or to reduced net foreign liabilities, imports in period (t) would fall below demand, implying a coefficient of adjustment $k<1$. This assumption may be particularly valid in the case that the level of imports is constrained either by the size of the market (for a given imported good) or by the availability of foreign revenues. These two factors are most probably relevant in the case of Portugal: as shown in the previous sections, at least in two moments of Portuguese economic history - the mid-1870s and the early 1890s -

were imports affected by the availability of foreign revenues.[1]

By substituting equation (2) into (5), we get the following extended equation:

$$(6) \qquad \ln M(t) = c0 + c1.\ln[PM(t)/PY(t)] + c2.\ln Y(t) + c3.\ln M(t-1) + u'$$

$$c1 < 0; \quad c2, c3 > 0$$

where **c1=k.a1, c2=k.a2, c3=1-k.** The basic parameters equivalent to those of equation (2) are thus given by dividing the parameters of equation (6) by the coefficient of adjustment **k** (k=1-c3). The mean time lag in the adjustment for imports is given by **1/k.**[2] The correspondent function for exports is:

$$(7) \qquad \ln X(t) = d0 + d1.\ln[PX(t)/PMW(t)] + d2.\ln MW(t) + d3.\ln X(t-1) + v'$$

$$d1 < 0; \quad d2, d3 > 0$$

where **d1=q.b1, d2=q.b2,** and **d3=1-q; q** is defined as k in the import function.[3] The results for the extended equations (6) and (7) are reported in tables 4.13 and 4.14 together with the results for the standard equations (2) and (3). I estimated demand functions for the whole period 1865 to 1913, as well as for the two sub-periods from 1865-1890 and 1890-1913, in order to

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1. See Goldstein and Khan (1978, p. 277), and Khan and Knight (1988).

2. See Goldstein and Khan (1978, p. 277).

3. For exports the lag in the equation may also be seen as an adjustment in demand. Although his formulation is slightly different from the one in the text Hatton (1990, p. 584) also allows "for a geometric lag between the determinants of demand and actual exports which would be expected to arise through the time taken to communicate demand and ship goods to docks."

account for the disturbances after Portugal left the gold standard (1890 to 1913).[1]

1. Hatton (1990) checks for a "structural break" around the same year, on account of raising tariffs in Italy, U.S.A., and France, and of the financial shock following the Baring crisis in 1890 (see p. 585).

Table 4.13
Estimated Parameters, Import Demand

Standard equation						
(1865-1890)						
a0	a1	a2	-	R2	DW	SER
1.029	-0.534	1.374	-	0.91	1.17	0.09
(0.68)	(3.60)	(6.26)				
(1890-1913)						
a0	a1	a2	-	R2	DW	SER
-0.476	0.347	0.786	-	0.59	0.71	0.10
(0.55)	(0.97)	(2.10)				
(1865-1913)						
a0	a1	a2	-	R2	DW	SER
1.398	-0.394	1.117	-	0.89	0.62	0.11
(2.00)	(3.92)	(14.46)				
Extended equation						
(1865-1890)						
c0	c1	c2	c3			
0.110	-0.229	0.691	0.555	0.94	2.45	0.07
(0.85)	(1.53)	(2.49)	(3.51)			
(1890-1913)						
c0	c1	c2	c3			
-1.178	-0.241	0.920	0.593	0.80	2.51	0.07
(1.83)	(0.83)	(2.89)	(3.14)			
(1865-1913)						
c0	c1	c2	c3			
0.202	-0.081	0.331	0.718	0.94	2.18	0.08
(0.38)	(0.93)	(2.54)	(6.67)			

Notes:
Standard equation
$\ln M(t) = a0 + a1.\ln[PM(t)/PY(t)] + a2.\ln Y(t) + u$
$a1 < 0;\ a2 > 0$
Extended equation
$\ln M(t) = c0 + c1.\ln[PM(t)/PY(t)] + c2.\ln Y(t) + c3.\ln M(t-1) + u'$
$c1 < 0;\ c2, c3 > 0$
c1=k.a1, c2=k.a2, c3=1-k; k is the coefficient of adjustment for imports (see text).
t-statistics between brackets; R2 is adjusted for degrees of freedom.
Full regression results given at the end of the chapter.
Sources: see table 4.10.

Table 4.14
Estimated Parameters of Export Demand

Standard equation						
(1865-1890)						
b0	b1	b2	-	R2	DW	SER
1.227	-0.074	0.790	-	0.77	1.42	0.11
(2.05)	(0.40)	(7.12)				
(1890-1913)						
b0	b1	b2	-	R2	DW	SER
0.331	0.060	0.834	-	0.84	0.89	0.08
(0.22)	(0.26)	(7.37)				
(1865-1913)						
b0	b1	b2	-	R2	DW	SER
1.466	-0.074	0.727	-	0.92	1.20	0.10
(4.02)	(0.79)	(20.32)				
Extended equation						
(1865-1890)						
d0	d1	d2	d3			
1.073	-0.119	0.565	0.310	0.76	1.96	0.11
(1.71)	(0.64)	(2.72)	(1.38)			
(1890-1913)						
d0	d1	d2	d3			
-0.278	0.108	0.359	0.583	0.88	2.08	0.07
(0.20)	(0.53)	(2.09)	(3.14)			
(1865-1913)						
d0	d1	d2	d3			
0.942	-0.062	0.428	0.414	0.93	1.99	0.09
(2.42)	(0.70)	(4.11)	(3.04)			

Notes:
Standard equation
$\ln X(t) = b0 + b1.\ln[PX(t)/PMW(t)] + b2.\ln MW(t) + v$
$b1 < 0, \quad b2 > 0$
Extended equation
$\ln X(t) = d0 + d1.\ln[PX(t)/PMW(t)] + d2.\ln MW(t) + d3.\ln X(t-1) + v'$
$d1 < 0; \quad d2, d3 > 0$
d1=q.b1, d2=q.b2, d3=1-q; q is the coefficient of adjustment for exports (see text).
t-statistics between brackets; R2 is adjusted for degrees of freedom.
Full regression results given at the end of the chapter.
Sources: see table 4.10.

As expected from better specification, the extend equation no longer has serial correlation of the first order, as it is shown by the values of the Durbin-Watson statistics. Furthermore, the R2 and the standard errors of the regressions (SER) point to the better fit of the extended regressions in comparison with the standard regressions, the improvement being of greater importance in the case of the regression for the period after 1890. Finally the coefficients for the lagged variable (c3) are all significant at the 1% level. The income elasticities (a2=c2/k) are also significant, though with the extend equation the level of significance is somehow reduced. The price elasticities (a1=c1/k) are not statistically significantly different from zero, except for the case of import demand in the standard regression for 1865-1913.[1]

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1. For further comments on the results see text, Section 4.4.

As expected from better specification, the extend equation no longer has serial correlation of the first order, as it is shown by the values of the Durbin-Watson statistics. Furthermore, the R2 and the standard errors of the regressions (SER) point to the better fit of the extended regressions in comparison with the standard regressions, the improvement being of greater importance in the case of the regression for the period after 1890. Finally the coefficients for the lagged variable (c3) are all significant at the 1% level. The income elasticities (a2=c2/k) are also significant, though with the extend equation the level of significance is somehow reduced. The price elasticities (a1=c1/k) are not statistically significantly different from zero, except for the case of import demand in the standard regression for 1865-1913.[1]

1. For further comments on the results see text, Section 4.4.

CHAPTER 5

CONCLUSIONS

Quantitative research on Portuguese economic history is in its infancy, which means that it is not possible at this stage to give a full macroeconomic analysis for the 1850-1913 period. The present study is a first attempt to quantify the growth of physical output and labour productivity, and to establish the main trends in foreign trade (after revising the official figures). I have not provided, for instance, estimates for the evolution of the services sector, for changes in the rates of unemployment or, in the specific case of the foreign sector, estimates for the balance of payments. Investment has not been treated here either. At this stage we know nothing about the share of investment in national output, or the rate of growth of gross or net capital formation. Notwithstanding, it has been argued in chapter 3 that investment rates could have been a

crucial factor marking the difference between success and failure in the export markets. The following summary of the basic facts of the Portuguese economy is thus necessarily incomplete.

In the years that immediately preceded the War, up to 60% of the (male) labour force was occupied in the agricultural sector. The industrial and the services sectors divided among them about equally the rest of the working force. According to contemporary estimates, by 1913 the value of agricultural output ascended to twice the value of industrial output. Such a proportion implies quite a narrow labour productivity gap - defined as the ration between the shares of output and labour in each sector - between the two sectors (approximately 86%). This narrow gap should be understood as a consequence of the fact that labour productivity in industry was low, and not that it was high in agriculture. It also indicates that the shift of resources towards the industrial sector could not have large short-run effects on overall labour productivity.

By 1850 the Portuguese economy looked quite different, because industry and agriculture increased at different rates. From 1850 to 1913, industry expanded at a trend rate of growth, in real terms, of about 2.5% per annum, whereas agricultural output increased at less than 1% per annum. Portugal clearly industrialized in the second half of the nineteenth century. Yet industrial development was rather smooth and no evidence was found on industrial spurts. In contrast to industry, we depict strong fluctuations in the output of the agricultural sector.

Agricultural production decreased in absolute terms during the 1850s and again after the turn of the century. In between we identified a period of fast growth which was partially due to the fact that agriculture was recovering from depression. Fluctuations in agriculture are explained, it is recalled, by the fact that a large part of the farm output (up to 25%) was dependent on wine, a plant crop which was severely affected by the oidium in the 1850s and the phyloxera later in the 1870s and 1880s.

The growth of output over the half century to 1913 was not accompanied by significant increases in factor productivity either in the agricultural or the industrial sector. As far as agriculture is concerned, growth was achieved mainly by the incorporation of additional labour and land into production. There were no important increases either in the productivity of land, or in the ratio of capital (i.e. working animals) per worker. Moreover, it is noteworthy that the growth of the farm output barely surpassed the increase in population. Thus, increases in consumption levels had to be met by increases in the import of foodstuffs. The industrial sector, which was throughout protected by tariffs and in some periods after Portugal left the gold standard, by a depreciated currency, developed in part by substituting imports. Growth by import substitution can be identified as the industrial expression of extensive growth, if it does not require structural changes leading to labour productivity increases, precisely as happened in the agricultural

sector. But a few comparative advantages in industry emerged, leading ultimately to the development of industrial exports. These developments were based to an unknown but probably significant extent, on direct foreign investment, namely in cork manufactures and canned fish. To these export industries we can add a few others that catered for the colonial and the Brazilian markets.

The patterns of extensive growth just described could reflect the fact that in Portugal capital was relatively dearer than labour and land. This could in turn reflect the fact that continuous economic growth was a relatively recent phenomenon in the country and thus that capital had only accumulated up to a low share of national output.

The structure of foreign trade is in agreement with the description just made of a recently developing agricultural country. Exports were predominantly composed of agricultural goods, and imports were dominated by foodstuffs, manufactured consumer goods and an increasing share of industrial inputs. The growth of the volume of exports was relatively intense in the years up to 1886, and stagnated during the following period. This stagnation in exports is not associated with stagnation in agricultural output which occurred, as mentioned, more than one decade later. On the other hand, import volumes evolved over an upward trend throughout the whole period, except for the short but deep depression during the early 1890s. One fundamental finding shown by the disaggregation of import trends was that

about three quarters of the decline of imports in these years was due to the decline of imports of manufactured goods. Thus, the heavily import dependent Portuguese industry was not affected by this blip in aggregate imports.

Our analysis of the decline in the trend of exports led to further conclusions regarding the relationship between growth and trade. We have surveyed several possible reasons for this decreasing rate of growth in the volume of exports, ranging from the alleged government failure to secure trade agreements, the failure of entrepreneurs to secure their markets when faced with increased competition from other competing agricultural exporters, or a bad natural resources basis. These elements were certainly present, but we have argued that they do not suffice to explain export trends. Let us briefly review these arguments here again.

After 1860, international trade - and not only within Europe - was increasingly framed by bilateral agreements by which countries exchanged special treatment. This is so despite the generalization of the most favoured nation clause in trade agreements, because the clause was given to goods specific to the signatory countries. During the 1860s and the following decade, Portuguese foreign policy managed to keep up with the negotiations going on throughout Europe. A trade agreement was signed with France in 1866, and between that year and 1876, when the difficult negotiations with Britain culminated in a treaty, Portugal signed agreements with most European countries. However,

when the complex net of agreements started to be revised in the late 1880s, Portugal was somehow left outside. Until 1908 no treaty was made with the countries that constituted Portugal's major markets. People in the country and abroad involved in the negotiations complained about the attitude of the Portuguese government, accusing it of inefficiency. According to some foreigners, governments changed too often, impeding a consequent commercial policy, and leading to the breakdown of negotiations. In a similar perspective which is basically an ex-post analysis, and in disagreement with some of the conclusions of the present study, I have argued elsewhere that the fact that Portugal was a protectionist country hindered the capacity of governments to negotiate commercial treaties because they were unwilling or unable to exchange tariff reductions. Unwillingness could have stemmed from the fact that tariff revenues weighed heavily in the government budget; and inability would be the result of the action of the interested pressure groups, that is industrialists and farmers.[1]

The second kind of reasons for the failure of Portugal to keep up with the negotiations going out throughout Europe, could be related with entrepreneurial failure to secure their markets, when faced with increasing competition from abroad. Again contemporaries have argued that Portuguese exporters did not keep up with international quality standards. In the case of

1. See Lains (1987).

Portugal's most important export good, wine, contemporaries and historians have pointed to the negative consequences of a supposedly excessive concentration on the stagnant British market, which would have hindered motivations to diversify the destination of exports to other expanding markets, such as those of Northern Europe, Brazil and Africa.

A third possible explanation for the slowdown of export growth is related to the availability of natural resources. It has been argued that Portugal could not compete satisfactorily on the export markets because its resource endowments led to the specialization in goods that had low demand income elasticities abroad. The international demand for Portuguese wines, cattle and fruits, for instance, did in fact increase less rapidly than world trade and world income. Portugal did not develop other kind of export branches, the argument goes on, because it was poor in mineral resources, in forest resources, or because its soil was relatively poor for scarcity of rainfall.

The discussion of the export experience of Spain and Italy, carried out in chapter 3, led to a revision of the causes of the slowdown of the growth of export volumes. Although demand factors, natural resource endowments and commercial policy were elements that helped to shape the curve of Portuguese exports, the fact is that supply constraints, related with the capacity to invest in the export sector, appeared as an important factor. Export growth is not necessarily exogenous to overall economic growth, to the extent that exports can be promoted by policy

measures independently of domestic supply conditions. It is hard to tackle the causal relationship between exports and growth, in particular if there is not enough information to construct a complete macro-economic framework. That framework could illustrate the basic assumptions of the export-led growth models, namely that of a higher marginal factor productivity in the export-oriented sectors or, less restrictively, the existence of unexploited resources.

To surmount these difficulties I have concentrated my attention on exploring the hypothesis of the presence of supply constraints of exportables, by making successive comparisons with other European agricultural exporters, in order to ascertain how they managed to keep or even increase their market shares in international trade. Due to the diversity of cases, I have concluded by inference that neither the configuration of international demand nor the structure of resource endowments seemed of paramount importance. Successful countries also had to overcome difficulties. Furthermore, I have also concluded that when those difficulties were overcome by policy measures, those were dependent not only on the supply capacity of each country, but also from its strategic position in the geography of Europe. Under this later perspective Portugal's position was disadvantageous because of its peripheral position.

A more detailed analysis of two major Portuguese export goods (corks and wine) has shown how the assumption that exports could be promoted by policy measures can be misleading. In corks,

Spain had a much higher productive capacity already by mid-century, catering for the nearby French market. Moreover, the Catalonian investments in the sector were complemented by French investments. In the case of wine, Portuguese exports in Europe had to compete with the Spanish in France and the Italian in Germany. The British market was glutted for Portuguese common wines, thus calling for the reconversion of exports which would require the reconversion of output and thus investment. Labour costs, as well as the cost of the raw material would have to make the whole difference between the two countries, so that Portuguese produce could compete with and eventually overcome Spain's.

Having this background in mind, Spain's success in exporting large quantities under tariff differentials to the otherwise protected markets of Germany and the United States appears in quite a different light. These comparisons show how difficult it was to promote exports through trade agreements which after all only secured markets for short periods of time, given that treaties were made and unmade according to changing conditions of domestic production in each country and according to changing strategic alliances. This does not mean that the role of foreign commercial policy should be dismissed as unimportant. Active commercial policy may have had an important role, but I have argued that its effectiveness would depend on the capacity of a given country to produce the goods to sell abroad. In this perspective, commercial policy would act as a complementary

factor of successful exports, rather then as a promoter of export growth.

These conclusions were reinforced by the comparison with the experience of the Scandinavian countries. In this case I have tried to show that success in export markets from these countries was due to their successive adaptation to the changing conditions in international demand, mainly provoked by the emergence of other non-European competing exporters. A survey of the major aspects of economic growth in Scandinavia pointed to the conclusion that the capacity to adapt was associated to general favourable conditions of domestic growth. This was so especially during the period usually associated to the so-called agricultural depression throughout Europe from 1873 to 1896, characterized by falling international prices, during which the structure of agricultural exports from Scandinavia changed considerably. These shifts were associated with transformations in the agricultural structure of these countries, which, as we have shown, were already drawn during the first half of the nineteenth century. Any inferences on export-led growth models regarding these countries should take into account the chronology of such structural shifts. Apparently changes in the structure of domestic output *preceded* those in exports.

As previously mentioned, our conclusions regarding the possibility that exports were hindered by misleading policy measures was based on inferences drawn from international comparisons, and we did not undertake the attempt to build a

counterfactual model of export growth, for lack of the necessary macro-economic data. However, the fact is, that the slowdown in the growth of exports after 1886 was not followed by a contraction of overall economic growth. In the case of agriculture this was so because exports did not account for such a large share of output and because agriculture benefited from cereal protection and the increase in domestic demand.

The analysis of import trends in chapter 4 revealed important features of the growth of the Portuguese economy and confirmed some of the findings drawn from the analysis of exports. Fluctuations in import were dependent more on fluctuations of other sources of foreign revenues, rather than exports, namely capital imports, emigrant remittances and, later, colonial reexports. Although emigrant remittances fell steeply after 1888, the fact is that the industrial sector was sufficiently developed in order that relative price changes derived from balance of payments disequilibrium, under the gold standard, were favourable to industry. Besides, other sources of foreign revenue, namely the earnings from colonial reexports, substituted for exports.

Moreover, leaving the gold standard in 1891 had positive effects on the commercial balance. All in all the financial crisis in the turn of the 1880s to 1890s was resolved by the contraction of imports of manufactures. After all, as has been hypothesized by other historians, this "crisis" could have had some positive effects for the Portuguese economy. However, the

truth is that after 1891 Portuguese economic growth became more dependent on imports than before. This can be understand as the inevitable reflex of the growing weight of the industrial sector, which, as already mentioned, employed imported inputs such as coal, cotton and chemicals. Import substitution had little to do with tariff policy. Imports of manufactures drop by 3/4 in just two years, before the 1892 schedule, generally considered as more protectionist. Moreover, increases in nominal tariffs were cancelled out by the increase in the price of imports.

Slack export growth and import dependence meant that Portuguese economic growth depended on the different sources of foreign revenue. This need was met to a large extent by emigrant remittances (and capital imports whose fluctuations were presumably related). When remittances increased, the Portuguese economy was positively affected through the effects on industry. Thus higher remittances in the early 1870s were immediately felt in the index of industrial output. The sharp drop of remittances following the disturbances in Brazil after the end of slavery and the subsequent troubles in the international financial markets of which the Baring crisis was just an element, were also reflected in industry.

What is most interesting to note in relation to the early 1890s is that, economic growth followed its pace of slow but continuous growth, despite the fluctuations in foreign revenues, and despite the fact that the industrial sector turned more dependent on imports. This increasing import dependence was a

consequence of growth by import substitution, which implied the production of manufactures based on inputs the country did not have, or had not yet developed. The agricultural sector also survived quite well the 1890s. This was partially due to the expansion of wheat and wine output, the former under protection since 1889. However, the output from agriculture reached a peak by 1900, stagnating thereafter. The absence of productivity increases might have hindered further expansion. By the same token, the industrial sector did not develop the capacity to export, except for the restricted protected colonial markets, as well as Brazil, and thus probably growth was also limited in industry.

The overall performance of the Portuguese economy was not brilliant, if nothing else because the gap that existed between levels of labour productivity or per capita income between Portugal and most of the other Western European countries was not bridged. The bottle was about half empty.

But it was also half full. The growth of the economy was smooth and the difficulties in the balance of payments derived from slow export growth and mainly from fluctuations in emigrant remittances, were overcome. This was indubitably due to the fact that large segments of the economy were isolated from the rest of the world, either for structural reasons or because of protective policies. It has to be recalled that the presence of industrial protection throughout the period meant that this particular measure of economic policy could not be, and was not, used to

curtail imports in face of balance of payments constraints. (Increments in protection levels were possible only for the agricultural sector).

The lessons we may draw from the 1890s are most interesting. The crisis in the balance of payments was solved by the drastic reduction of imports of manufactured goods. Industrial output, despite its high import content, kept its pace. In other words, the shift in relative prices that stemmed from external imbalance, under the gold standard, was favourable to the industrial sector. Moreover, the sector also reacted positively to the changes derived from flexible exchange rates, although in this case uncertainty might have brought additional costs. The rapid response from the industrial sector shows that it was sufficiently strong by the 1890s. Probably the investment in the sector over forty years of relatively slow but smooth growth meant that by the 1890s there were resources enough to respond to adverse conditions. Otherwise it would be difficult to understand how imports of industrial inputs did not contract in the late 1880s and the early 1890s, as opposed to imports of manufactured goods.

It is also noteworthy that by the 1890s the overall system was sufficiently flexible to the extent that substitutes were found for the contracting imports of capital and remittances, namely foreign revenue earnings from colonial reexports, which boomed after 1891. This fact shows the importance that the colonies had for the Portuguese economy, and in particular for

its finances. But the positive contribution of the colonies should not be overemphasized. What is important to stress, according to what has been argued here, is not the particular role of the colonies, but the fact that a solution was found for the difficulties in the balance of payments.

These conclusions are much in disagreement with the writings of some nineteenth century authors and many of today's historians of Portugal, in the sense that even those who recognized the achievements of the economy would expect that they would be even more widespread, arguing that, after all, Portuguese potential was immense. Here we have proposed an alternative view, according to which the Portuguese economy fared relatively well, given the constraints derived from its unfavourable starting level of development and its position at the periphery of Europe. Despite the large social, political and other functional problems, the hypothesis that in the long-run the economy expanded close to its potential, seems worth taking into account, despite the possibly wrong and thus costly choices of economic policy. The space for manoeuvre for alternative policies was probably low.

To conclude that individuals after all acted in the best way, despite the institutional backwardness of the country is to argue that a *competitive paradigm* was in force. According to that paradigm each individual maximizes his welfare and thus will attain a certain level of output where no one can be better-off without decreasing the welfare of someone else, or in other

words, a Pareto optimum.[1] The acceptance of this paradigm does not imply that one agrees with one of its basic assumptions, according to which individuals act rationally in such a way that they manage to overcome institutional or other obstacles in order to achieve their maximum possible welfare, and thus that their competitive behaviour would yield Pareto efficiency.[2] As Pollard and Kennedy argue, regarding the British "climateric", a period when the British economy apparently "failed":

> "(...) the issue is not whether the Victorians obeyed the rules of game, but whether 'the rules of the game [were] actually drawn up in such a way as to ensure that individual competitive behaviour would yield, at least approximately, Pareto optimal results for the economy as a whole.'"[3]

We can thus redirect our attention from the role of individuals - whom we may assume to act rationally - to the analysis of the "rules of the game". The question thus is whether these rules were built in such a fashion that they would ensure that private and public interest coincided. Nineteenth century analysts had clear ideas of what was wrong in the organization of the Portuguese economy, and society in general, principally when they were politicians standing in opposition to the government. Many of the solutions proposed were so attractive that they reached

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1. See Kennedy (1987, p.3).

2. Rational competitive behaviour can of course lead to non competitive solutions. Protectionism, for instance, may be seen as the outcome of the action of individuals acting rationally and under competition among themselves.

3. Pollard (1989, p. 111), quoting Kennedy. See also Kennedy (1987, chap. 1).

our times as the correct panaceas. Let us then conclude by analysing what they said and by checking whether their proposed solutions were soundly grounded.

The background of those analyses were dominated by a critique of what was identified with the *Regeneradores*, the political party born with the *Regeneração* in 1851 and that was in power for 2/3 of the time since then until 1890. This party was in turn identified with its leader, Fontes Pereira de Mello, who died in 1887. Fontes, as he was popularly known, was the politician who best personalized what Sérgio has called the "transport policy", meaning in this case the construction of road and railway networks, paid by foreign loans.[1] Politicians fighting the *fontismo* were not in total disagreement with the system it would have created. They just argued that more could have been done, precisely by state intervention. The criticism of what we have called above the competitive paradigm, and which was identified by some authors with the *fontismo*, was present in contemporary minds, as it may be inferred from the following words of Bazílio Teles (1903):

> "(...) several thousands of individual incompetence (...) shall never form intelligence and thus find a satisfactory solution. (...) In other words: spontaneous solutions are always in delay in relation to the natural facts that provoke them: they do not prevent, they remedy. The State has to

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1. On Sérgio see chapter 1.

intervene."[1]

The most prolific analyst of all was undoubtedly Oliveira Martins who, although above the party system - his preferred institution was the monarchy -, can be identified with the oppositionist *Progressista* party. It should be noted that Martins, together with Sérgio, was one of the authors that most influenced Portuguese economic historiography concerning the nineteenth century. Martins' influence is even more clear on what concerns those historians who tend to propose alternative policy choices that, according to them, would lead to more favourable paths of growth. That is to say, those historians who, according to what has been set up in chapter 1, fail to take into account the possibility that growth was hindered by the growth potential of the country, and not as much by the action of Governments, industrialists, large land-owners, exporters, bankers, railways speculators, or whatever.

A cursory analysis of Martins' views on the role of the State may help to understand how difficult it would have been to change the rules of the game and thus to follow an alternative path of economic development in Portugal. It is not surprising that after waiting for so long for a place in government, he was finally made Minister of Finance in January 1892, but managed to

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1. Teles (1903, pp. 270-71). "(...) muitos milhares de incompetências individuais (...) jamais chegarão a constituir inteligência e portanto a encontrar-lhe solução satisfatória. (...) Noutros termos: as soluções espontâneas vão sempre em atraso relativamente aos factos naturais que as provocam: não previnem, remedeiam. É o Estado que deve intervir."

keep the job just for 4 months. In 1885 Martins (1954) wrote that the major structural problems of the Portuguese economy were concentrated in three sectors: the public deficit, the tax regime, and the "organization of circulation". The list of measures proposed by Martins to alter the situation was long and it is worth while to present it here in order to understand how far reaching those problems were.[1] The list is the following:

a) To introduce an income tax and to reform the industrial and property taxes (which were not proportional taxes but lump sums on the capital stock).
b) To reduce indirect taxes that burdened the poorer classes given that they were mainly imposed on essential goods.
c) To reduce the financial autonomy of the regional administrations, in order to reduce their ability to raise taxes, to spend, and to run into deficits.
d) To census public property in order to sell it and reduce the central government deficit.
e) To declare the "principle of nationalization" of the railroads, and to proceed according to the financial capacity of the state.
f) To organize money supply, in order that the emission of banknotes reaches an optimum level.
g) To reform the public service in order to reduce costs.

But Martins (1954) also proposes other kind of measures that would direct and indirectly affect production. The list is again long, and includes the following measures:

a) To increase the area under crop by irrigation and to promote forestation of the areas not suited for agriculture.
b) To fixate the people that emigrated to Brazil from the north of the country in the underpopulated areas of the south by forming "agricultural centres".
c) To reform tariffs on imports, in order to promote industry.
d) To introduce a legal code for the industrial labour and

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1. Martins (1954, pp. 14-16).

to reform the commercial code.

e) To promote professional education.

f) To promote the fisheries and the fish and shipping industries.

g) To promote the economic development of the colonies.

A profound analysis of the pertinence and applicability of these measures is of course out of the scope of this concluding chapter, and we can even doubt if that would be at all possible: its like analysing a government programme in our days. However I have exposed them here to show that the role proposed for state intervention was rather complex. And one could wonder how resources could be found to simultaneously reduce the government deficit, which after all was not astronomic in Europe, and invest in railways, irrigation, forests, agricultural centres, education, the colonies, and so forth. Moreover, some of the measures would probably be incompatible. For instance if the means were found to reduce emigration to Brazil that would have created problems in the balance of payments due to the consequent reduction of remittances, and that in turn would endanger industrial growth that had to purchase inputs abroad. Industrial growth could have been based on the exploitation of domestic resources, by processing agricultural goods. That would of course imply investments in agriculture but, most importantly, it would have implied the reduction of tariffs that distorted prices in favour of import substitution. The consequences for state finances would then be serious given that about half of the government revenue was collected by tariffs on industrial and agricultural imports. Tariffs could of course be substituted by

an income tax, which could have distributive effects and consequences on investment rates (and set Portugal out of tune of the rest of the European countries where government revenues were derived from tariffs in a similar proportion). Moreover, after 1891 import substitution was pushed not by tariffs but by currency depreciation, following the abandonment of the gold standard.

Martins does not include in the above lists measures related to the foreign sector, but other authors filled the gap. An extreme example of that is the project to build a duty-free port in Lisbon, paid by foreign capital, and which was proposed by Mariano de Carvalho, the Minister of Finance right before Oliveira Martins (1886-1891). Portugal could attract Brazilian private capital to invest in a regular shipping route between the two countries - *if* a trade agreement were signed between the two countries -, as well as attract American capital to invest in the necessary port facilities.[1] According to the ex-minister's friend that reports the project, Mariano de Carvalho managed to call the attention of his American interlocutor when he argued that American wheat, timber and oil exports to the Mediterranean countries could pass through Lisbon, where it would be stored in the warehouses (to be built), in order to get better prices and thus compete favourably with the Russian produce. The reaction of the "American" was enthusiastic. His final comment was: "(...)

1. Pina (1983, pp. 74-77).

Fantastic! It looks as an American idea! But that could change the world's commercial channels!"[1]

This comment leads to the main conclusion I would like to draw from the present study: it is hard to envisage how realistic policy measures could have induced higher economic growth in Portugal. The counterfactual world of a wider integration of the Portuguese economy in the international markets appears as attractive. Economic theory can tell us what tools could be used to foster that integration. Moreover, we know from the historical experience of other countries that it would have bring wider benefits. Yet the domestic constraints of the Portuguese economy and the outer world would have to look quite different. The half century up to World War I was too short for the accomplishment of the needed changes.

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1. Pina (1893, p. 77). ["Com a breca! Dir-se-ía ideia americana! Mas isso poderia mudar as correntes comerciais do mundo!"]

APPENDIX A

INDICES OF AGRICULTURAL AND INDUSTRIAL OUTPUT

Data resources for the Portuguese economy in the period here considered include, among other minor sources, a fairly reasonable set of statistics for main agricultural products and prices, three livestock census and three partial census for industry. Most of this information has recently been worked out, in different formats, by Reis (1986a), who estimated a first index of industrial production for 1870-1913, and David Justino (1988-1989), who exhaustively compiled and published the available statistics on Portuguese agriculture.

This statistical appendix is a first attempt to put together all this quantitative information in the form of estimates for output growth and labour productivity trends in Portuguese agriculture and industry and to discuss the reliability of these

estimates. This discussion will be based on checks for the consistency of the main body of the data. This data will also be cross-checked against additional evidence on agricultural prices, land productivity and land distribution among crops. I will start by presenting the estimates for agricultural output growth, and then I will proceed to the industrial sector. Industry will be dealt with in a less detailed fashion given that my work relies on Jaime Reis' previous estimates. Finally, in the last section of this appendix, estimates for labour productivity trends will be presented.

A.1 - Agriculture

The data on which agricultural output indexes are based consists fundamentally of official statistics. These official figures are usually contested on the grounds that they underestimate real production, although some authors have admitted this under-evaluation as being constant throughout the period.[1] To check the reliability of that data I will rely on assumptions regarding either consumption trends or market behaviour of the products. Furthermore, some of those assumptions

1. See, among others, Justino (1989, pp. 32-33), Pery (1875, p. 113), Reis (1979, p. 755) and Soares (1873, pp. 6, 12, 20).

will be tested according to information from independent sources. Finally, my estimates will be compared with the quantification of agricultural output attempted by contemporary authors. This will not be considered as a test of reliability given that these authors, although disregarding official statistics, make their "guessestimates" with official statistics as background. The aim of these comparisons will be to show the extent to which my conclusions agree with current contemporary opinions.

The official statistics available for Portuguese agriculture cover its three major productive sectors: cereals (i.e. wheat, maize and rye), animal products and wine. The total value of these sectors adds up to a relative stable share of roughly 80% of total agricultural output (excluding forestry products).

Official production statistics for cereals cover one half of the number of the years of the 1850-1913 period. To this we can add some unofficial estimates for the first decade of twentieth Century. Wine production statistical coverage is not as good, as far as official data is concerned, but we have further information of specialised journals. Finally, animal products were estimated on the basis of the figures for meat consumption in Lisbon and Oporto, the two main cities, and three livestock census produced in 1852, 1870 and 1906.[1]

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1. For further details see Lains (1990) and Justino (1988-1989). According to the latter, the 1906 census is based on the 1870 census with some further adjustments. The next livestock census (1925) cannot be used for backward extrapolations because it was greatly affected by World War I.

Two main problems were posed in the use of these resources: how to complete the information to construct continuous series and how to test the accuracy of the data. In the case of cereals the solutions to these problems converged. I assumed that per capita consumption of the principal food staple of the population could not suffer severe fluctuations, because there were no important food crises in the period studied. This fits with the fact that the population increased steadily in this period at rates between 0.7% and 0.9% per year. With the above assumption in mind, I estimated per capita consumption levels for the years for which I had data, and extrapolated to nearby years of unknown production. Production was estimated after taking in account foreign trade and seed and animal uses of cereals. Three year averages were used to account for adjustment time lags in consumption, stocking and foreign trade levels (see table A.1 at the end of the appendix).

To ascertain the quality of the above index, I checked the plausibility of the long-term trend of the cereal per capita consumption on which it is based. This was done by computing the implicit income elasticities for cereal consumption, and by comparing the results against the available evidence for other countries or for other periods (see table A.2). These elasticities were computed in a rough way by comparing rates of growth of income and cereal consumption. For the growth of income I used two sets of figures which show similar growth rates: Justino's (1987) indirect estimates for per capita income; and

the final results of the output indexes here estimated. The use of my figures for output growth will also be a test of their internal consistency.

In these comparisons it is worth taking into consideration an alternative estimate for per capita cereal consumption trend presented by Mateus (1986). Elasticities for the three different kinds of cereals were considered given that their consumption patterns were quite different as a consequence of substitution of higher quality wheat bred for poor types of bred (maize and rye). The structure of cereal consumption was inferred from official production statistics, assuming that the possible accounting error is equal for each kind of cereal, which is not a very strong assumption. For each hypothesis concerning per capita cereal consumption, I had to compute a new final output index.

From the values presented in table A.2 it may be seen that the trend for cereal per capita consumption considered in the present estimates - i.e. the trend implicit in the official statistics - leads to plausible results for the elasticities. As a matter of fact, although the total elasticity for cereals is rather low, it may be noticed that the one relating to wheat is compatible to estimates for other countries in the same period or for Portugal in recent times.[1] Portugal was a country with a

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1. Nineteenth century income elasticities for the demand of foodstuffs is usually between 0.5 and 1. Crafts (1980, pp. 154-59) estimated a value of 0.74 for Britain in the years 1820-40. Colin Clark (1951, pp. 378-79) gives 21 values for that elasticity of which 19 fall in the 0.65-0.90 interval. It is more difficult to obtain nineteenth century consumption cereal elasticity

relatively high consumption of bread made of cereals other than wheat. The consumption trends depicted in table A.2 seem in accordance with an expected shift from poorer bred cereals to wheat bred.

It is worth noting that the agricultural output index does not vary significantly with the elasticity considered. As a matter of fact, if we take the higher value for the cereal consumption income elasticity of table A.2, that is if we take a value of 182kg per head for 1900, the estimated rate of growth for agricultural output changes only slightly. The value considered in the present text, if anything, under-evaluates the rate of agricultural growth. For the conclusions put forward in chapters 1 and 2, this is the best choice.

We may turn now to the index for animal products. This index is estimated through meat output given that the available evidence points to similar productivity trends in meat, wool and milk per animal (cattle, pigs, sheep and goats).[1] Meat output was estimated through two different sources that were cross checked:

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contd.

estimates, specially for different kinds a cereals. See also Prados (1985, p. 17). Evidence for twentieth century Portugal show a wheat consumption income elasticity of 0.14 in the 1961-80 period (Soares, 1985, pp. 80-81)); and for consumption of "products made of cereals" in the years 1963-73 of 0.4 (Martins e Oliveira, 1979, p. 63)). It is difficult to proceed further in these comparisons because we only have at our disposal income elasticities estimates for aggregate food consumption. Nevertheless we may conclude that the long-term growth of my estimates is under-evaluated once the implicit elasticity value is rather low. If this proves to be true, my conclusion that long-term agriculture output growth surpassed that of population seems rather safe.

1. For meat and wool productivity trends see Lains (1990).

statistics from the slaughter houses of the two main Portuguese cities, Lisbon and Oporto, and three cattle stock censuses made in 1852, 1870 and 1906. To provide for meat production after the census figures it was necessary to resort to contemporary writers and official evaluations for the share of slaughtered animals and their respective weights. These evaluations do not show important dissimilarities.[1]

In table A.3 estimates for meat consumption according to the two different sources are presented. The trends estimated from the different sources are similar, although consumption levels were higher in the urban areas than in the whole country.[2] As a last possible check for these values, we may compare the trend of meat consumption with the trend of the consumption of the second most important source of animal protein in Portugal, cod fish (taken from import statistics). Between 1840/50 and 1895/99 cod fish per capita consumption rose at a rate similar to the on e of meat, from 3.6kg/head to 4.0kg/head. From 1895/99 it increased slightly faster, to 5.4kg/head in 1910/13, while meat consumption decreased. From this trend it appears that protein consumption

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1. See Lains (1990).

2. Meat output from slaughter houses of these towns was certainly a small proportion of total meat output. An estimate for the 1950s still puts that proportion between 50 and 60% (Mexia, 1956, p. 41). It is possible that that proportion increased over time due to the construction of municipal slaughter houses and due to the improvement in standards of hygiene. If this is so, the use of slaughter house statistics would lead to an over-estimation of meat output growth.

rose slightly until the end of the century, being stable from then on; and it depicts a substitution effect between meat and cod fish in the first decade of the twentieth century.[1]

The wine output index could not be computed through consumption patterns, as was the case for the other two indexes, because there is no straightforward relationship between them. As a matter of fact, part of the wine output is stocked, either to improve its quality or for other marketing purposes. This being so, I had to resort to official production statistics, which provide the only continuous series. It should be stressed that this might not be a severe limitation given that official statistics proved reliable in showing trends for cereal and meat output.

Yet, official statistics for wine output do not cover the whole period. For the years between 1863 and 1897 there are only output values for the average of the years 1863/70 - the original series having been probably lost - and for the years of 1873, 1880 to 1885, 1892 and 1893; from 1903 until 1915 there is another gap. For this last period we also have statistics computed by a business newspaper, which may be linked to the scattered official sources given that there is agreement of overlapping three year averages.

To fill in the gaps for the period previous to 1903, I

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1. The trend of per capita meat consumption from table A.4 seems to concur with the evidence related to meat consumption tax statistics presented in Pereira (1979, p. 81).

resorted to evidence regarding the quality of the crops of the years for which statistics are available, to ensure that the scattered quantitative information is representative of the trends of the respective periods. For instance, both 1893 and 1898 were considered by contemporaries authors as years of low wine crop at, respectively, 3500 and 4300 million hectolitres. Consequently, the rate of growth of wine output given by the comparison of these two figures may be considered as representative of the growth in the period given that years of similar crop conditions are being compared (see table A.5).

To ascertain the reliability of my estimates for wine output, mainly in what trends and output fluctuations are concerned, I compare in graph A.1 the output index with an index for prices estimated by Justino (1988-1989). The general patterns presented in that graph are quite clear: wine output and prices had inverse movements which present similar turning points. This general pattern is interrupted, though, in the period from 1873 to 1885 (and it is also less clear from 1846 to 1852, hypothesising a larger output fro 1846).

The fact that wine prices and output have divergent trends may be a consequence of inelastic demand.[1] Being this so, output increases would lead to price decreases, and vice-versa. It remains for us to explain, then, why in the 1873-1885 period

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1. For estimates of income elasticities of British demand for imported wines see Lains (1986, pp. 400-401). The evidence there presented points out to negative values for that elasticity. This result is only indicative given that it cannot be extended to a wine producing country like Portugal.

prices and output had the same positive trend. This would imply that demand was expanding and dominating market conditions. Due to the large import market opened in France in the aftermath of the invasion of its vines by phylloxera, demand conditions were in fact particular from the early 1870s to the mid 1880s. This would somehow validate my index, although not in a definite way. To be more positive about these assumptions it would be necessary to estimate internal and external demand functions for wine. Furthermore, we have to bare in mind that exports accounted for a small, although increasing, share of output.[1]

Of the three partial indexes here computed, the wine index is the less homogeneous given that its prices show a greater variety of wine types. Portugal was a producer of mainly three kinds of wine: port wine, madeira wine and common wine (a fourth quality appeared later on: "vinho verde"). While, for instance, price differential for cereals (wheat/rye) and for meat in 1861/70 reached a coefficient of 1.53 and 1.01, respectively, the same ratio for wine was 3.64. In the year of 1884, which will be used here as the base-year for the agricultural output index, those differences were, respectively, 1.38, 1.24 and 3.21.[2]

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1. The share of wine exports on production given by official statistics increased from 14% in 1871/73 to 49% in 1886/88. If the underestimate of official output statistics is considered, according to contemporary estimates, these rates would be 9% and 34%, respectively.

2. Based on prices from Justino (1988-1989). The wines considered are wine sold in Oporto (not only port wine) and the cheapest wine, sold in Penafiel.

These differences in wine prices cause an index number problem given that the structure of wine output changed in Portugal after the 1880s as a consequence, first of all, of the phylloxera wine disease, and, secondly of the wide increase in demand for wine exports. It may happen that the increase in wine output after those years pictured by my index were partially offset by a decrease in prices, given that the share of common, lower-priced, wines increased.[1] And in fact the available contemporary estimates for the structure of agricultural output further used point to a slightly lower wine proportion in 1900/09 compared with 1884, although output has risen by 33.6%, between those dates.

For the aggregation of the three indexes here estimated I considered evaluations of agricultural output, according to major contemporary works on Portuguese agriculture, presented in table A.7.[2] It may be noticed from the same table that there are no

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1. See Pereira (1983, pp. 127, 151) and Lains (1990).

2. Considering gross and not net output as a measure of agricultural growth in a country like Portugal in the second half of the nineteenth century is not a major shortcoming. As a matter of fact it may be inferred form the available evidence that gross and net output evolved in the same way, that is, agriculture was not purchasing more products from other sectors, which is characteristic of a backward agricultural sector. For the years 1957/62, Hayami and Ruttan (1980, p. 319) estimated a proportion for net/gross output in Portuguese agriculture of 90%. The secular evolution of that proportion may be inferred from the French evidence presented by Clark (1951, p. 216). From the second half of the eighteenth century until the 1880s the net/gross output ratio was estimated at 95% decreasing since then in the following way: 90% in 1895/99; 85% in 1910/13; and 80% from 1920/24 until 1940/46. According to these figures, Portugal in the early 1960s appears to be at a position similar to the French one in 1895/99, leading to the assumption that in the century before 1860 there was a reduction of 5 percentage points in that ratio. This would give a difference between rates of growth for gross and net output of

considerable disparities among these contemporary estimates: Portuguese agricultural production appears to have had a quite regular structure throughout the period considered. Among other things, this regularity allow us to take the aggregation of the three indexes as a proxy of overall agricultural growth (excluding forestry), given that the residual share was quite constant in value.

From the values set in table A.7 we may also conclude that my estimates are somehow consistent with the contemporary estimates shown there. Conclusions from these similarities should not be pushed too far, though, because the contemporary estimates are not truly independent from the statistical basis I used here. Although most of the authors disregarded the official data as being under-evaluated, their estimates were to a large extent based on presumed correction coefficient for those statistics. Furthermore, the different estimates were not truly independent of each other, given that the different authors were implicitly or explicitly influenced by each other. Finally, I had to made some assumptions when the authors did not give values or when those values were unacceptable. For instance, the estimated share for fruits and vegetables in 1900/09 was arbitrarily considered at 7% (close to the other evaluations) given that the contemporary source for that decade gives a share of 50%, i.e. a

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contd.

0.05% per year throughout the century 1860-1960.

not reliable value for fruits and vegetables equal to the rest of agricultural output. These assumptions are nevertheless of minor importance as is evident from the notes on table A.7.

The contemporary evaluations of agricultural output are here presented in a concise fashion in order to draw conclusions on the growth trend for agriculture implicit in those estimates, which were never compared in a inter-temporal basis. In table A.8 the implicit rates of agricultural growth from those sources are computed and compared with my own estimates. It is clear from this table that, despite some important discrepancies, there are some points of agreement between the two approaches, namely as regards the overall rate of agricultural growth. Although the conclusion we may infer from these comparisons is quite positive for my estimates, it has to be again stressed that it is not legitimate to conclude that the present estimates are confirmed by contemporary estimates, given that they are not truly independent, as already mentioned. What may be concluded is that my output growth indexes do not conflict with contemporary opinions on agricultural conditions.

Tables A.9 and A.10 show the available data on land productivity trends and land use, as given by official statistics and contemporary observers. These statistics were used on the main text, together with assumptions on capital formation, to estimate the contribution of land, capital and labour for agricultural output growth, according to the classical method of

assuming a Cobb-Douglass production function.[1]

Soil censuses for Portugal are usually disregarded by economic historians for being inaccurate. However changes in crop areas between the census of 1867 and 1902 are compatible with my estimates for output growth in wine and cereals and the evidence on soil productivity trends of these two sectors. As a matter of fact, according to these census, cereal and wine areas increased by 24% and 53%, respectively, while their soil productivity increases were about 10% for cereals and about 50% for wines.[2] The rates of output growth for the same period (1870-1903) respectively, 35% and 100% (see chapter 2).

The patterns of growth for cereals and animal products presented here may be compared with absolute and relative price trends in graphs A.2 through A.4 (wine output/price trends were discussed above). Graph A.2 pictures a decreasing trend for the relative prices of cereals and meat (a proxy for animal products prices) from 1855 to 1885; cereal tariff protection since 1886

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1. This function is in the form (K, L and T stand for agricultural capital, labour and land; A for technical progress; and the subscripts for agricultural income shares):

$$Q = A \times K^{a} \times L^{b} \times T^{c}, \qquad a + b + c = 1$$

Among the vast bibliography on theoretical and practical issues concerning the use of this production function see Nadiri (1970) and Carré et al. (1976), McLean (1981), Matthews et al. (1982, chapt. 7), Crafts (1985); and the short review provided by Gould (1972, pp. 118-19). A discussion of the use of this function to measure and compare countries' per capita growth of productivity is given in Martina (1977).

2. The increase in soil productivity is computed from table A.9. In the case of cereals I considered average productivities, weighted by the shares of maize, wheat and rye in cereal output.

implied an inversion of this trend. This is in accordance with output growth given by my indexes. First of all, throughout the 1846-1912 period, animal products output increased more than cereal output (57% against 37%), in accordance with price trends. This correspondence is also evident from the fact that the difference in the rates of output growth for these sectors was *lower* in the period of rising cereal prices (in absolute and relative terms). Graphs A.3 and A.4 show how output in these sectors responded to rising prices.

A.2 - Industry

The industrial production index here estimated is based on the procedure proposed by Reis (1986a) in a similar estimate for the 1870-1913 period. I limited myself to extending the same index back to 1851 (with some gaps), to fill the gaps for the years 1882 and 1883 in the first index and, more importantly, to check the basic assumptions underlining his calculations.[1] Briefly, the method of Jaime Reis consisted of estimating technical coefficients for the use of imported industrial inputs

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1. These gaps are due to the gaps of the Portuguese import statistics used to construct indexes for most of the industrial inputs (see further).

in the following sectors: woollens, cottons, linens, metallurgy, paper and tobacco. The index for food industries was taken as the increase in total population. The production of two other industries, mining and canned fish, was estimated through export volumes, given that more than 90% of their production was exported. Price indexes were computed through import prices (plus tariffs), assuming that trends were similar to the internal industrial prices. This assumption does not seem too strong if, as will be seen, we consider that the present indexes are mainly representative of the most modern industrial branches, concentrated in Lisbon and Oporto, major foreign trade centres. The aggregation of the various partial indexes thus estimated was based on fixed sectorial shares, referring to the end of the century, and computed through industrial population census and estimated value added per worker in each sector.

The main task of the present work consisted in ascertaining the hypothesis of fixed coefficients for the entire 1850-1913 period, and finding another set of aggregate weights for an earlier period. My sources were partial industrial census made in the 1860s, mainly of a regional character, and another census of the number of industrial workers for 1852.[1] This research into

1. For further details see Lains (1990). The census are: Coelho (1860), Colaço (1863), Oliveira (1867), Sá (1863), Sá (1857), Silva (1861) and Silveira (1864). It is worth noting that these censuses, as well as the one of 1891, were produced in periods when major discussions over tariff policy or commercial agreements were being held, such as the 1852 tariff schedule, the 1866 commercial treaty with France (which was the base of further tariff reductions), and the 1892 tariff schedule. For a description of industrial census in this period see Matos (1991, pp. 562-68).

early Portuguese industry shows an unfavourable trend for the growth of the industrial productivity, in the sense that most technical coefficients remained at similar levels, with the important exception of wool industry (and probably cotton).

The sample of available information with which to estimate technical coefficients is quite different from sector to sector. Wool and linen industries are quite satisfactorily represented, while for cotton, metallurgy and cork industries the information is quite scarce. The paper index prior to 1870 was estimated by contemporary estimates, while Reis' figures regarding tobacco and food industries were maintained, for lack of other sources. Estimates for value added per worker are better for woollens and paper; for linens and metallurgy I had access only to information related to large size industries, where it was observed that value added per labour was *lower*, compared with smaller plants. Instead of taking the average, I considered the value added of the smallest factory in each sector.[1] For tobacco no information regarding value added was available and so an arbitrary value was taken (with a margin of error presumably equal to the range of the values for the other sector, i.e. 30%). Food, ceramics and soap industries estimates for value added were also based on scarce information.

The quality of the estimates briefly described above is

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1. For differences in labour productivity in larger and smaller industrial units see the discussion in O'Brien and Keyder (1978, Chap. 6) and Crafts (1984, pp. 59-67).

lower than the correspondent estimates produced by Jaime Reis. As such they have to be used with even greater care. Nevertheless the present estimates serve to test the confidence interval of the industrial production indexes regarding the values for technical coefficients and value added per worker. As will be evident, these indexes are not as much dependent on the assumptions concerning the estimates for partial indexes as on the weights chosen for their aggregation.

As previously stated, the aggregation shares were computed by multiplying the value added per worker by the total number of workers in each sector. Given that Jaime Reis used estimates for labour shares for the end of the period (circa 1910), it was necessary to estimate correspondent shares for an earlier period. Information from two census produced in 1845 and 1852 was used. They are presented in table A.11 together with the shares for 1910. It may be noticed that, except for food industries, the values given by the 1845 and 1852 censuses are quite similar, although the latter concerns only industrial units with more than 10 workers-equivalent.[1] Furthermore, the pattern given by the comparisons of the shares at the beginning and at the end of the period here considered seems plausible. Jaime Reis' hypothesis II depicts a more modern type of industrial growth, given that

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1. For 1852 the figures are taken from an official report, published in 1857, where the equivalence 1 horsepower = 7 workers is used. Although this criteria is arbitrary, it does not distort the results, as may be inferred from the comparison of the data on this report and the same data published by Justino (1988-1989).

metallurgy and canned fish, two more modern industries, attain higher values. It may be noticed that, from the sectors presented in table A.11, ceramics and soap industries are left out.

The major shortcoming of using the values of table A.11 for aggregation purposes stems from the fact that its coverage of the total industrial labour force is rather low and biased towards those industries which had a higher concentration in production. As a probable consequence of this, there is a bias towards the more modern industries. This would explain the low shares attributed to sectors like the linens, food, ceramics and soap industries which are presumably less concentrated industrial sectors. The low representativeness of the sample may be inferred by comparing the totals for the workers on these census with the estimated total labour force in industry taken from table A.18 (cf. notes on this table).

The representativeness of the sample for the labour force (12% of total labour force in industry) is quite lower than the one of the 9 partial indexes for industrial production (60% of gross output, using contemporary estimates).[1] Consequently, partial industrial growth rates are probably quite reliable, while the overall estimated rate of growth of total industrial output is biased toward the growth of presumably over-represented sectors such as cottons, woollens, metallurgy and canned fish. Consequently, the resulting growth rate of industrial output is

1. See Reis (1986a).

probably biased upwards.[1] It may be noted that most of the industrial production indexes estimated for other countries suffer from similar problems, i.e., a larger coverage for more modern sectors, and a large dependence on the shares used for aggregation. This would imply that the index for Portugal is comparable with the first versions of industrial production indexes for other countries.[2]

The observed variations in the composition of industrial labour force are the following: an increase in food industries and metallurgy, while woollens share decrease. Mining and canned fish are sectors which are only relevant from the 1870s, and so they are not considered in the first system of weights. Consequently, the weights for circa 1850 should be used until 1870-1875, and from then on, shares for circa 1910 (see table A.14). It should be pointed out that long-term rates of growth given by the different indexes are quite similar, although the cumulative effect is obviously considerable. But the major differences concern growth rates for the various cycles, which happen to have roughly the same peaks and troughs.

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1. For the discussion of the probable index biases see Reis (1986a, pp. 926-28). As counter-weights for the bias toward the more modern industrial branches, that is, as probable sources of industrial growth under-estimation, Reis points to the exclusion of presumably more dynamic industries as cements, chemical fertilisers and electricity; and, more importantly, the fact that fixed technical coefficients were used.

2. See the same point in Reis (1986a, p. 904). The dependence of the results on the aggregate shares is shown, for instance, by the discussion of Deane and Cole's (1962) estimates by Harley (1982), or Carreras' (1984) index by Prados (1988, pp. 163-67) and Carreras (1990, pp. 89-95).

A test of the consistency of the overall results is given in table A.15 and is provided by the comparison of total industrial output growth given by table A.14, that is, using total value added, and the growth given by the estimated indexes for gross output. To estimate the growth of total value added at fixed prices it is necessary to take into account that value added per worker for the beginning of the period relate to circa 1865 (although labour force distribution is from 1852), and those for the end of the period relate to 1891 (while labour shares are from 1910). The implicit real growth rates, that is after subtracting price trend compare favourably with the rates given by the indexes here estimated. These computations are totally independent of each other, and so they provide a test for the consistency and reliability of the estimates for industrial growth. Note, nevertheless, that this test does not imply that the estimated indexes are representative of the whole of Portuguese industry (and not only of the more modern branches), because no information whatsoever about the non-observed sectors was added: it only allows us to conclude that, for the sample of industries considered, the results are consistent.

A.3 - Labour productivity trends and physical output growth

To estimate labour productivity trends it was necessary to provide some estimates for labour force growth and its distribution among agriculture, industry and services. Labour productivity here estimated is, in fact, output per worker, and so no variations in the number of hours per year and per worker were accounted for. These estimates are presented in tables A.16 through A.18.

Population census giving the required information are available only for the years 1890, 1900 and 1911. For the previous years it was necessary to approximate total labour force by the number of males in the 15-59 age group.[1] Estimates for the composition of labour force prior to 1890 are more precarious but their reliability is rather satisfactory, given that this was not a period of important structural changes in Portugal and, consequently, the range of possible values is rather narrow. As a matter of fact, the 1890 census figure still gives a quite large share for population in agriculture, so the same share for previous years could not have been much larger, if a regression in agricultural production conditions in the period is excluded, as output estimates present in the first section allow.

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1. Only male labour force was considered because of errors in measuring female labour force, especially as far as sectorial distribution is concerned. See Maddison (1982, Appendix C).

More importantly, the width of labour shares may also be given by international comparisons. These are provided by comparing the Portuguese case with the average for European countries, at similar levels of GDP per capita. One of the established regularities of modern economic growth concerns the shift of labour from agriculture to other sectors, specially the industrial. For the nineteenth century this regularity has been made explicit by Crafts' (1984) regressions for 17 countries (as well as for a separated sub-set of 9 later-developers) of GDP per capita and population on the agricultural labour share. These regressions provide a way of estimating the expected labour share for given levels of GDP per capita and country population size. From the two values for the European "norm" I used the one which fits better the available information for Portugal for benchmark years of the period 1890-1960, according to the available information on Portuguese GDP per capita, discussed in chapter 1 (see table A.19). The estimated values for labour force structure are quite rough, and special caution is required in using the 1850 figure.

Estimates for physical output growth are given in table A.20, and compared with estimates for GDP growth from Justino (1987). Physical output growth was computed by averages for growth rates in agriculture and industry, weighted according to

contemporary estimates for gross value of these sectors.[1] As may be seen, these estimates picture similar trends in what long-term growth is concerned. Nevertheless, cyclical fluctuations are quite different, especially for the sub-periods 1850-1870, 1890-1900 and 1900-1911. These differences stem from the fact that Justino's estimates are less sensitive to fluctuations in national income because two of the four variables on which they are based (Government expenses and fiscal revenue) are "institutional" (the other two variables are Portuguese exports and imports). Contrarily, as stated before, my indexes are more sensitive to fluctuations in output, especially from the agriculture sector.[2]

The similarity between long-term growth pictured by the different estimates above, that is between physical output and

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1. For 1900, Jaime Reis (1984), based on Castro (1978), uses a ratio of agricultural to industrial output of 2:1. This ratio is compatible with the productivity gaps between agricultural and non-agricultural sectors (SPG) estimated by Crafts (1984) for some European countries, based on a regression of SPG on GDP per capita and population. Crafts distinguishes between a set of 17 European countries and a sub-set of 9 later-developers. The value of SPG for later-developers correspondent to Portuguese GDP per capita in 1890 is 2.08. Given the distribution of labour in the same year, that gap would imply a share of agricultural income in total income of 49.3%. If agricultural income was twice as large as the industrial, as Castro and Reis propose, the share of industry in Portuguese income would be 24.7%, implying a plausible residual share for services in 1890 of 26.0%.

2. By institutional variables I mean economic variables that are dependent on institutional factors. For instance, Portuguese nineteenth century tax revenue included an industrial tax which was paid according to the existent machinery and not according to output, as well as import tariffs which depend on modifications of tariff schedules. By the same token, Government expenses included fixed expenses like interest payments on public debt, and military expenses, among others. These are factors which tend to smooth out Justino's estimates for GDP growth trends. For a critique of the methodology see Lains and Reis (forthcoming).

GDP growth estimates, would imply that the long-term output growth of the service sector was similar to physical output growth. The proportionality between service and physical output growth is also evident from the pioneering works for international comparisons of income growth of Clark (1951) and Kuznets (1956). Portugal would then be another case to include in this general pattern of growth, prior to World War II.[1] This would not imply that proportion of services output was not increasing: it would only mean, as O'Brien (1978, pp. 28-32) has argued, that that increase was embodied in the measured growth of physical output (at least for the nineteenth century). An industrial good produced in, say, 1910 would then include a higher contribution from services - as transport, banking and marketing - than the equivalent good produced in 1850.[2]

It is possible to test the above assumption concerning the contribution of services to output growth in the case of Portugal by estimating: (1) the implicit growth rate for the labour

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1. See also the review of the evidence for the United States by Carré (1960, pp. 15-18). Empirical evidence produced since the contributions of Colin Clark and Simon Kuznets confirm their findings. In fact, the proportion of the service sector in countries like Germany, Great Britain, France or Spain remained roughly stable throughout the second half of nineteenth century, up to 1910. See Mitchell (1975, p . 811); Toutain (1987, p. 58) and Prados (1988). See also Lee (1986, p. 76).

2. In a critique of O'Brien and Keyder's (1978) work on the comparison of British and French *commodity* output, Crafts (1984, p. 56) argues that the exclusion of the service sector hides important differences in economic structures of these countries. Nevertheless he does not contest the fact that rates of income growth may be approximated by physical output growth. On this debate see further O'Brien (1983, pp. 80-84).

productivity - more precisely, for the output per worker - for the service sector; and (2) the resulting growth rate for the service output.[1] The first rate of growth may be given by the following equivalences:

$$Y = Y(a) + Y(i) + Y(s)$$

$$y = Y / L = l(a) \times y(a) + l(i) \times y(i) + l(s) \times y(s)$$

$$dy = l(a) \times dy(a) + l(i) \times dy(i) + l(s) \times dy(s)$$ where,

Y = total income; L = total labour force
Y(a), Y(i), Y(s) = income in agriculture, industry and services
y = total income per worker
y(a), y(i), y(s) = sectorial incomes per worker
l(a), l(i), l(s) = sectorial shares of labour force
d is for rates of growth

Using 1890 as base year as in table A.20, dy(s) is computed from:

Period 1850-1900:
l(a) = 0.669; l(i) = 0.183; l(s) = 0.148
dy = 0.80; dy(a) = 0.34; dy(i) = 1.72
and, dy(s) = 1.76

Period 1870-1910:
l(a) = 0.669; l(i) = 0.183; l(s) = 0.148
dy = 0.84; dy(a) = 0.60; dy(i) = 1.40
and, dy(s) = 1.22

These estimates for labour productivity growth in the service sector imply growth rates for the service sector output of 2.54% and 2.50% per year, respectively in the periods 1850-1900 and 1870-1911. If the shares given above for the composition of physical output are considered, the above rates would imply GDP growth rates of 1.75% (1850-1900) and 1.78% (1870-1911), slightly

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1. This same test could have been done backwards, that is, by estimating first the implicit growth rate of services output, and then the resulting rate of labour productivity. This alternative is nevertheless less reliable because shares for output distribution are more approximate than shares for labour distribution.

higher then the estimates for physical output growth.

These exercises are not supposed to substitute for further research on physical and service output growth. They are only attempts at providing yardsticks to give an idea of the probable margin of error of the estimates given in the present work. From the above evidence it may be concluded that the use of my estimates for output growth as a proxy for GDP growth tends to underestimate the latter.

Table A.1

Consumption and Production of Cereals, 1846-1912

Year	Consumption (kg/head)	Population (000)	Total Consumption (ton)	Net Imports (ton)	Production (ton)
	(1)	(2)	(3)	(4)	(5)
1846	149	3458.9	606 325	- 5 000	611 325
1849	148	3471.3	604 415	-12 000	616 415
1852	156	3485.1	639 618	- 6 000	645 618
1855	153	3520.3	633 654	1 000	632 654
1858	159	3589.5	671 448	- 2 000	673 448
1861	152	3696.2	660 968	10 000	650 968
1864	151	3821.9	678 949	38 000	640 949
1867	150	3898.2	687 918	34 213	653 705
1870	150	3968.0	700 325	37 889	662 346
1873	[149]	4039.1	708 030	26 337	681 693
1876	[149]	4111.4	720 704	91 863	628 841
1879	[148]	4199.9	731 277	126 982	604 295
1882	150	4320.8	762 494	115 210	647 284
1885	145	4445.1	758 282	134 080	624 202
1888	[150]	4573.0	807 000	114 216	692 784
1891	[155]	4694.6	856 074	123 436	732 638
1894	[155]	4799.5	875 203	141 008	734 195
1897	155	4906.7	894 751	128 009	766 742
1900	160	5019.4	944 828	165 359	779 469
1903	160	5156.1	970 560	75 087	895 473
1906	158	5299.7	985 121	117 567	867 554
1909	155	5447.3	993 331	150 841	842 490
1912	152	5598.9	1001 215	144 873	856 342

Notes and sources:

In this table and the following Azores and Madeira are excluded. The years refer to the centre of three year averages.

(1) Consumption per capita is from official statistics from Justino (1989, p. 268); for wheat output see also Reis (1979, pp. 756-57). To convert capacity measures in weights, I used the following values: maize: 1hl=77kg; wheat: 1hl=76kg; rye: 1hl=72kg. See Soares (1875, p. 3), Costa (1900, pp. 579-82) and Justino (1989). Per capita consumption estimates between brackets are linear extrapolations for years for which there are no official data.

(2) The population series is based on linear extrapolations from the census of 1864, 1878, 1890, 1900 and 1911, and Pereira (1983, p. 19).

(3) Total cereal consumption is the sum of human and animal consumption, plus cereal used for seeds ((1)x(2)/0.85). See Soares (1875, p. 5).

(4) For 1842, 1843, 1848, 1851, 1854-56, 1861 and from 1865 onwards imports are from offical statistics (Lains, 1986). For the other years, I used additional information from Ribeiro (1864, pp. 97-99).

(5) Production is total consumption less net imports.

Table A.2
Estimates for Income Elasticities of Demand for Cereals

		(A)				(B)			
		Total	Maize	Wheat	Rye	Total	Maize	Wheat	Rye
Consumption per capita (kg/head)	1850	148	87	36	25	149	88	36	25
	1900	160	80	58	22	182	91	66	25
Growth, 1850-1900 (%, per year)		.15	-.16	.94	-.25	.40	.07	1.22	.00
Elasticities	I	.22	-.23	1.40	-.37	.55	.10	1.67	.00
	II	.21	-.22	1.29	-.34	.55	.10	1.67	.00

Notes and sources:
Total = total human cereal consumption.
Consumption per capita of column A is taken from table A.1 (1849-1900); column B is from Mateus (1986). To estimate the consumption shares of maize, wheat and rye I used official figures for production shares. See Lains (1990). Income elasticities for cereal consumption are computed by dividing growth rates of cereal consumption by estimated income growth rates. These last estimates are the ones given by the indexes of physical output (agricultural and industrial) growth of the present work (line I); or the estimates for GNP growth from Justino (1987) (.73% per year) (line II). My estimates for physical output growth are dependent on the assumption regarding the growth of cereal per capita consumption (see text). Accordingly the output rates for columns A and B are different: .67% and .73% per year, respectively.
The similarity between the estimates for income growth shows that my estimates are not too dependent on the assumptions regarding the growth of per capita cereal consumption.

Table A.3

Estimates for Meat Consumption

Lisbon and Oporto			Portugal		
Year	Kg/head	1870=100	Year	Kg/head	1870=100
1848/52	28	108	1852	21	124
1868/72	[26]	100	1870	17	100
1873/77	27	104	-	-	-
1903/06	30	115	1906	20	118

Notes and sources:

The sources for Lisbon and Oporto are the statistics of municipal slaughter houses (Justino, 1986: 268), and for the whole country the sourceare from the livestock census. Livestock was converted into meat by fixed coefficients for official and non-official estimated shares of animal slaughtered, and their respective weights (see Lains, 1990). The figures used for the final meat output index are the ones relative to Lisbon and Oporto, given that the other figures are to a greater extent dependent on assumptions relative to conversion into meat: if instead of fixed coefficients, estimates for 1852 by Soares (1855, pp. 11-20) were used, for example, the value for the meat consumption would be 19 kg/head to which an value of 112 would correspond.

Table A.4

Consumption and Production of Meat, 1846-1912

Year	Consumption (kg/head)	Total Consumption (ton)	Net Imports (ton)	Production (ton)
	(1)	(2)	(3)	(4)
1846	[18.2]	62 952	494	62 458
1849	[18.2]	63 178	300	62 878
1852	18.2	63 429	391	63 038
1855	[18.0]	63 365	881	62 484
1858	[17.9]	64 252	1 000	63 252
1861	[17.7]	65 423	3 427	61 996
1864	[17.5]	66 883	5 473	61 410
1867	[17.4]	67 829	3 445	64 384
1870	17.2	68 250	- 76	68 326
1873	17.7	71 492	3 790	67 702
1876	17.7	72 772	5 639	67 133
1879	18.4	77 278	4 052	73 226
1882	18.4	79 503	1 844	77 659
1885	19.9	88 457	4 808	83 649
1888	19.8	90 545	3 512	87 033
1891	19.8	92 953	2 229	90 724
1894	19.8	95 030	760	94 270
1897	19.4	95 190	2 508	92 682
1900	19.4	97 376	165	97 211
1903	19.7	101 575	1 963	99 612
1906	19.7	104 404	-245	104 649
1909	18.2	99 141	9 120	90 021
1912	18.2	101 900	543	101 357

Notes and sources:

(1) Consumption per capita is taken from Lisbon and Oporto slaughter house statistics published by Giraldes (1946) and Justino (1988-1989) (cf. table A.3).

(2) Total consumption is estimated as in table A.1.

(3) Net imports of meat are estimated from net imports of cattle (cf. table A.1 for the statistics) assuming that the average weight of imported and exported animals was identical and that all net imports were for slaughter. This assumption does not take into account the fact that there were some animal imports for fattening, but the bias cannot be significant given the relative shares of animal net imports over production. Fresh meat net imports were considered too.

(4) Production is consumption less net imports.

Table A.5

Wine Production, 1846-1912 (000hl)

1846	[2 500]	1882	2 528
1849	2 568	1885	3 713
1852	2 996	1888	[3 700]
1855	1 516	1891	[3 500]
1858	946	1894	[3 300]
1861	1 013	1897	[4 300]
1864	[1 452]	1900	5 708
1867	[1 903]	1903	4 742
1870	[2 355]	1906	4 568
1873	2 042	1909	4 816
1876	[2 193]	1912	4 008
1879	[2 354]		

Notes and sources:

Official statistics for wine cover the years 1848-1862, the average for 1861/70, 1873, 1892, 1893 and 1898 to 1903. These were published by Justino (1986: 268). For 1880 to 1885, (presumed) official statistics were published in *A Vinha Portuguesa* (1886, pp. 54-55). Until 1900, and except for 1846, the gaps were filled with information regarding the quality of the crops, in order to ascertain the comparability of the years for which quantitative information is available. From 1900 the statistics considered are from *Comércio do Porto* (29/12/1917), which are in accordance with official statistics for the averages centred in 1902 and 1916. For further details see chapter 2, and Lains (1990).

Table A.6

Indexes for Agricultural Output, 1846-1912
(1870=100)

Year	Cereals	Wines	Animal Products	Total
1846	92.3	106.2	91.4	96.3
1849	93.1	109.0	92.0	97.6
1852	97.5	127.2	92.3	104.9
1855	95.5	64.4	91.4	84.6
1858	101.7	40.2	92.6	79.8
1861	98.3	43.0	90.7	78.8
1864	96.8	61.7	89.9	83.7
1867	98.7	80.8	94.2	91.7
1870	100.0	100.0	100.0	100.0
1873	102.9	86.7	99.1	96.6
1876	94.9	93.1	98.3	95.5
1879	91.2	100.0	107.2	99.3
1882	97.7	107.3	113.7	106.0
1885	94.2	157.7	122.4	123.1
1888	104.6	157.1	127.4	128.4
1891	110.6	148.6	132.8	129.7
1894	110.8	140.1	138.0	128.9
1897	115.8	182.6	135.6	142.9
1900	117.7	242.4	142.3	164.2
1903	135.2	201.4	145.8	159.1
1906	131.0	194.7	153.2	158.0
1909	127.2	204.5	131.8	152.5
1912	129.3	170.2	148.3	148.2

Notes and sources:
Partial indexes are taken from tables A.1, A.4 and A.5. "Total" is the aggregation of the former three indexes according to value shares for 1884 from table A.7 (bottom). As the structure of agriculture did not change considerably the index is not sensible to the base year chosen. Furthermore it is representative of the whole non-forestry agricultural index given that the residual remained roughly constant (see table A.7).

Table A.7
Contemporary Estimates for Agricultural Output

	1853/62	1861/70	1884	1898	1900/09
Volumes	(1)	(2)	(3)	(4)	(5)
Wheat (000 hl)	2 000	2 680	1 966	2 553	3 355
Maize (000 hl)	5 600	6 781	4 481	7 540	7 100
Rye (000 hl)	2 400	2 136	1 694	2 800	2 100
Wine (000 hl)	5 000	3 483	3 257	5 200	7 600
Meat (ton)	33 817	67 285	?	96 311	93 400
Dairy	?	?	?	?	?
Wool (ton)	?	?	?	4 474	5 500
Potatoes (000 ton)	130	202	180	[277]	350
Olive oil (000 hl)	149	276	213	600	628
Fruits and Vegeta.	?	?	?	?	?
Values (contos)	(1)	(2)	(3)	(4)	(5)
Wheat	7 246	9 710	7 196	10 400	17 000
Maize	12 981	15 853	12 860	22 100	21 300
Rye	3 485	4 800	5 624	7 700	8 400
Wine	36 000	19 586	22 050	23 000	36 000
Meat	7 396	13 718	17 000	24 811	25 000
Dairy	1 300	6 737	7 000	8 500	[8 600]
Wool	1 700	2 000	[2 000]	1 072	2 000
Potatoes	2 348	4 040	5 760	6 100	7 000
Olive oil	2 228	5 200	3 209	10 800	12 600
Fruits and Vegeta.	5 400	6 972	5 000	7 300	[10 000]
Total	*80 084*	*88 616*	*87 699*	*121 783*	*147 900*
Value Shares	(1)	(2)	(3)	(4)	(5)
Cereals	29.6%	34.2%	29.3%	32.9%	31.6%
Wine	44.9%	23.1%	27.4%	27.4%	22.7%
Animal Products	13.0%	22.1%	25.1%	18.9%	24.3%
Other	12.5%	20.6%	18.2%	20.8%	21.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Notes and sources:
(1) Figueiredo (1873, pp. 262, 264, 281, 282).
(2) Soares (1873, pp. 3, 8, 12, 18, 20, 22). The olive oil price was corrected according to Justino (1988-1989) and Pereira (1983, p. 191).
(3) Mateus (1986, table A.3). Dairy and wool products were taken as equal proportions as in 1861/70. This source is considered "contemporary" because its author corrects the official values according to contemporary evidence.
(4) Costa (1900, pp. 117, 317, 340, 571). The author does not give output values, so agricultural prices from Justino (1988-1989) were used.
(5) Pereira (1915, pp. 57, 77 84, 98, 231, 240, 343, 371). Fruits and vegetables were evaluated at 180 000 contos which is manifestly exaggerated. I used the 1861/70 proportions instead.

Table A.8

Comparison of Indexes for Agricultural Output Growth
(1900/09=100)

Contemporary estimates					
	1853/62	1861/70	1884	1898	1900/09
Cereals	79.6	92.4	64.8	102.7	100.0
Wine	65.8	45.8	42.9	68.4	100.0
Meat	36.2	72.0	?	103.1	100.0
Total output					
Value	54.1	59.9	59.3	82.3	100.0
Prices	88.8	93.1	86.9	100.8	100.0
Volume	60.9	64.3	68.2	81.6	100.0

Present estimates					
	1852/61	1864/70	1882	1897	1903/09
Cereals	74.9	75.1	74.5	88.3	100.0
Wine	34.4	40.4	53.7	91.3	100.0
Animal products	63.9	66.0	79.2	94.5	100.0
Total output					
Volume	55.6	58.7	67.7	91.3	100.0

Notes and sources:
"Contemporary" estimates are taken from table A.7. The partial indexes are deducted from growth quantities. Prices are from Justino's (1988-1989) agricultural price index. "Present" estimates are those of table A.6. Note that this only a indicative comparison, and no conclusions can be drawn regarding the reliability of my index. Nevertheless it should be pointed out that total output trends given by both approaches are similar. For partial indexes important differences are those for wine and meat in 1853/62. The contemporary source for this period seems, though, in broad disagreement with the other sources, given the implausible rates of growth for wine and meat, compared to the subsequent periods.

Table A.9
Comparisons of Agricultural Productivity Levels

Cereals and Potatoes (kg/ha)

Portugal	France	U.K.	Spain	Europe(*)
Wheat				
1861/62: 546	1862: 1201	1892: 1840	1857: 457	
1902/3: 591	1902: 1359	1902: 2293	1901/10: 900	1909/13: 1280
Maize				
1861/62: 830			1857: 702	
1902/3: 952				1909/13: 1460
Rye				
1861/62: 357			1857: 364	
1902/3: 454			1901/10: 791	1909/13: 1490
Potatoes				
	1862: 11555	1892: 14618	1857: 2290	1880: 7008
1912/13: 7000	1902: 7671	1902: 14114		1909/13:11440

Animal products (kg/head)

Portugal	France	U.K.
Cattle meat		
1852: 220		1850: 331
1906: 250	1910: 421	1907/8: 306
Wool		
1851/62: 1.9	1892: 2.4	1892: 2.2
1901/3: 2.0		

Mediterranean crops (hl/ha)

Portugal	France	Spain	Italy	Hungary
Wine				
1870: 15	1870/72: 17	1857: 5		
1903/12: 22	1903/12: 31	1903/12: 12	1903/12: 10	1903/12: 13
Olive oil				
		1857: 1.24		
c.1900: 1.76		c.1900:1.41	c.1900: 1.76	

(*) Russia excluded
Sources: Eddie (1968, p. 213), Mateus (1986, p. 13), O'Brien and Keyder (1978, pp. 120-21), Pereira (1915, p. 384-85), Tortella (1985a, p. 78-79).

Table A.10

The Use of Land

Area	1867 000 ha	1867 %	1902 000 ha	1902 %
1-Under crop	1 886	21.3	3 111	35.1
Cereals	1 127	12.7	1 392	15.7
Vines	204	2.3	313	3.5
Olive-trees	200	2.2	329	3.7
Fruit-trees	70	0.8	131	1.5
Gardening and other	295	3.3	946	10.7
2-Not under crop (*)	2 072	23.4	1 926	21.7
3-Agricultural (1+2)	3 958	44.6	5 037	56.8
4-Forestall	1 240	14.0	1 956	22.1
5-Productive (3+4)	5 198	58.7	6 994	78.9
6-Not cultivated (fit)	3 329	37.5	1 534	17.3
7-Not cultivated (unfit)	341	3.8	341	3.8
TOTAL (5+6+7)	8 868	100.0	8 868	100.0

Sources: Bastos (1936, p. 25, table X), Mateus (1986, p. 10) and Pereira (1915, p. 337).

Notes: The 1867 census figure for the area under forest was not used, given that thickets (*matas*) were incorrectly included: an area equal to the one in 1902 was admitted (600 000 ha). Most of the area not cultivated, but fit, in 1903 had a potential for forestation, as may be inferred by the fact that in 1960 2/3 of it was occupied by forests.

The original designations are the following: "Superfície: 1-agrícola cultivada; 2-agrícola inculta (pastagens, pousios e charnecas produtivas); 3-agricola; 4-florestal; 5-produtiva; 6-inculta mas cultivável; 7-incultivável."

Table A.11

Labour Force by Industrial Sectors
(000, %)

Sectors	Workers employed							
					c.1910			
	1845		1852		I		II	
	No.	%	No.	%	No.	%	No.	%
Cottons	3 001	31.4	4 867	34.5	21 011	33.7	20 264	27.1
Woollens	2 342	24.5	3 702	26.3	10 357	16.6	11 647	15.6
Linens	208	2.2	383	2.7	2 678	4.3	2 678	3.6
Food indus.	512	5.4	[750]	5.3	4 568	7.3	4 568	6.1
Cork indus.	77	0.8	164	1.2	4 580	7.4	6 634	8.9
Tobacco	407	4.3	1 325	9.4	4 136	6.6	3 372	4.5
Metallurgy	670	7.0	823	5.8	3 814	6.1	9 134	12.2
Paper	936	9.8	1 071	7.6	1 689	2.7	2 100	2.8
Ceramics	1 406	14.6	942	6.7	2 543	4.1	3 968	5.3
Soap indus.	na	na	64	0.5	764	1.2	764	1.0
Canned fish	-	-	-	-	6 136	9.9	9 688	12.9
TOTAL	9 559	100%	14 091	100%	62 276	100%	74 817	100%

Sources: Reis (1986a) and Lains (1990).
Notes: The food industry figure for 1852 was corrected by the correspondent share for 1845 given that the original figure was too low (i.e., 103). For the year circa 1910 two hypothesis are considered by Jaime Reis: higher shares for metallurgy and canned fish mean that hypotheses II presents a more "modern" type of industrial growth. Note that these census are probably biased towards the more modern industries in each sector, what would account for the lower shares for less concentrated industries like linens, ceramics or soap. See on this matter Reis (1986a, p. 927) and Lains (1990).

Table A.12

Value Added by Industrial Sectors

Sectors	Value added (contos)							
	c.1850			c.1910				
					I		II	
	per w.	total	share	per w.	total	share	total	share
Cottons	.115	559	25.9	.138	2895	22.0	2792	17.5
Woollens	.203	752	34.9	.253	2620	19.9	2947	18.6
Linens	.196	75	3.5	.235	630	4.8	630	4.0
Food indus.	.192	144	6.7	.399	1823	13.8	1823	11.4
Cork indus.	.140	23	1.1	.167	763	5.8	1105	6.9
Tobacco	.150	199	9.3	.333	1377	10.5	1123	7.0
Metallurgy	.214	176	8.2	.306	1166	8.9	2791	17.5
Paper	.067	72	3.4	.168	283	2.1	352	2.2
Ceramics	.152	143	6.7	.155	394	3.0	615	3.9
Soap indus.	.092	6	0.3	.362	277	2.1	277	1.7
Canned fish	-	-	-	.153	936	7.1	1478	9.3
TOTAL	.153	2149	100%	.212	13164	100%	15932	100%

"per w." = value added per worker at current prices.
"total" = value added per worker x working force;
"share" = sectorial shares of value added.
Sources: Table A.11, Reis (1986a, p. 920) and Lains (1990).
Notes: Estimates for value added per worker are based on various regional industrial census published circa 1865, and on the 1891 national industrial census: thus, they are evaluated at prices for c.1865 and c.1890, respectively. Figures for c.1910 should be more reliable, although the coverage of both census is rather small.

Table A.13

Indexes for Industrial Output, 1851-1914

Year	PIL	PIR 1	PIR 2
	(1865=100)	(1900=100)	
1851	72.5	32.9	31.6
1854	88.8	35.4	34.2
1855	90.6	35.8	34.5
1856	93.0	35.3	35.0
1861	105.6	32.9	33.1
1865	100.0	39.7	38.3
1866	108.5	40.4	38.6
1867	114.2	41.2	39.9
1868	111.0	40.4	38.5
1869	115.1	41.8	40.4
1870	115.4	48.5	45.5
1871	106.8	41.0	40.0
1872	132.3	46.9	47.3
1873	158.7	57.2	55.2
1874	171.4	52.5	53.5
1875	175.0	52.7	52.8
1876	163.3	48.4	47.9
1877	176.8	56.8	54.7
1878	174.9	55.1	53.4
1879	178.8	54.5	51.6
1880	163.4	49.3	49.7
1881	190.3	53.5	53.6
1882	182.4	56.9	57.6
1883	196.8	56.2	56.9
1884	200.9	57.5	58.0
1885	216.4	56.3	57.7
1886	279.3	67.0	69.0
1887	252.7	69.9	72.1
1888	246.2	70.6	72.6
1889	256.5	64.3	67.9
1890	214.1	74.8	79.1
1891	263.0	69.3	73.2
1892	276.5	68.6	71.8
1893	308.9	74.5	75.8
1894	266.9	71.5	71.8

Table A.13 (contd.)

Year	PIL	PIR 1	PIR 2
1895	286.5	77.6	78.0
1896	251.2	76.1	76.4
1897	279.3	87.4	86.6
1898	292.6	89.5	89.3
1899	313.9	93.5	91.4
1900	349.5	100.0	100.0
1901	316.6	94.9	96.4
1902	334.0	98.0	99.7
1903	346.3	103.3	106.2
1904	365.0	108.2	109.9
1905	318.2	97.5	102.0
1906	303.3	98.4	105.4
1907	369.5	108.7	113.7
1908	340.6	104.9	109.7
1909	333.9	107.2	109.8
1910	404.8	115.5	120.4
1911	455.4	127.2	133.3
1912	425.9	125.5	136.6
1913	441.3	128.2	137.8
1914	354.3	110.6	114.2

Sources: Reis (1986a) and Lains (1990). PIL and PIR are the aggregates of partial industrial indexes, according, respectively, to value added shares relative to c. 1850 and c.1910 of table A.12. To take into account changes in the industrial structure, PIL should be used for the period between the decades of 1850 and 1870, while PIR should be used from the 1870s onwards (see text).

Table A.14

Rates of Growth for Industrial Output, 1854-1911
(%, per year)

Period	PIL	Period	PIR1	PIR2	Average
1854-1861	2.51	1854-1865	1.05	1.03	1.78 (*)
1861-1875	3.67	1865-1873	4.67	4.67	4.17 (*)
1875-1890	3.98	1873-1890	1.59	2.14	1.87 ($)
1890-1900	1.07	1890-1900	2.95	2.37	2.66 ($)
1900-1911	2.44	1900-1911	2.21	2.65	2.43 ($)
1854-1875	3.28	1854-1873	2.56	2.55	2.92 (*)
1875-1911	2.69	1873-1911	2.21	2.65	2.43 ($)
1854-1890	3.57	1854-1890	2.10	2.36	2.68 (♯)
1890-1911	1.78	1890-1911	2.56	2.52	2.54 ($)
1875-1900	2.82	1873-1900	2.09	2.23	2.16 ($)
1854-1911	2.91	1854-1911	2.27	2.52	2.57 (♯)

Source: computed from table A.16.
Notes: The above periods were defined according to peak years, i.e. the years at which differences to trend values, given by OLSQ regressions, were larger. The value of the trend rate of growth lyes between 2.09% and 2.73% per year. The rates of the last column are averages weighted by the representativeness of each index, according to:

(*) = 1/2 PIL + 1/4 PIR1 + 1/4 PIR2
($) = 1/2 PIR1 + 1/2 PIR2
(♯) = 1/3 PIL + 1/3 PIR1 + 1/3 PIR2

Table A.15

Comparison of Estimates for Industrial Output Growth
(%, per year)

Total value added in industry (*contos*)				
1850		1910		
			PIR1	PIR2
At 1865 prices	2 149	At 1891 prices	13 164	15 932
Price index (1865=100)	0.97	Price index (1891=100)	0.96	1.01
At 1850 prices	2 085	At 1910 prices	12 637	16 091

Annual growth rates, 1850-1910			
	PIL	PIR1	PIR2
From values above			
Nominal growth	-	3.05%	3.46%
Price trends	0.27%	0.59%	0.56%
Real growth	2.78%-3.19%	2.46%	2.90%
From table A.13 (real growth)	2.91%	2.27%	2.52%

Sources: Tables A.12 and A.13. Prices from Lains (1990).

Table A.16

Total Male Labour Force (000)

Census years	Total population	Total male population	Male labour force: Census	Male labour force: Estimtd.
[1854]	3 492	n.a.	n.a.	962
1864	3 830	1 842	n.a.	1 053
1878	4 160	1 996	n.a.	1 144
1890	4 660	2 251	1 752	1 242
1900	5 016	2 402	1 916	1 328
1911	5 548	2 637	2 019	1 435

Sources: Pereira (1983) and Silva (1970)
Notes: Estimated male labour force (last column) is male population from the 15-59 age group. This proportion and the proportion relative to male population only (shown between brackets) did not vary significantly: 1864: 27.5% (n.a.); 1878: 27.5% (57.2%); 1890: 26.7% (55.2%), 1900: 26.5% (55.3%); 1911: 25.9% (54.4%). From 1890 to 1911 estimated and census male labour force have the similar rates of growth.

Table A.17
Agricultural Labour Force and GDP per capita

Year	GDP per capita Portugal ($1970)	Labour force in agriculture (%)			
		European norm		Portugal	
		All	LDCs	Total	Male
	(1)	(2)	(3)	(4)	(5)
1850	274	72.7	68.7	n.a.	[68.7]
1870	262	74.4	69.7	n.a.	[69.7]
1890	317	69.1	66.8	61.7	66.9
1911	353	66.4	65.3	57.4	61.0
1950	481	58.0	60.8	49.1	53.8
1960	687	47.4	54.8	43.4	49.3

Notes and sources:
(1) GDP extrapolated backwards from Summers and Heston (1988), which have been interpolated to 1970 dollars, to fit Crafts' regressions.
(2) and (3) "European norm" are averages for structural economic variables in nineteenth century Europe, estimated through linear regressions on GNP per capita and population size by Crafts (1984). For the share of agricultural labour force in total population (AGLAB) the relevant regressions are ("all" = 17 European countries; "LDCs" 9 countries with a per capita income of less than $500 in 1880):

All - AGLAB = 238.655 - 30.186 ln Y + 2.808 ln POP
(15.033) (-12.128) (3.304)
R2 = 0.794; SEE = 7.290

LDCs - AGLAB = 161.524 - 17.004 ln Y + 2.070 ln POP
(3.994) (-2.648) (1.449)
R2 = 0.244; SEE = 7.637

(4) Census agricultural labour force.
(5) From 1890, census male agricultural labour. For the previous years (1850 and 1870) I assumed that the share for *male* agricultural force for Portugal was equal to the share for *total* agricultural labour force given by the European norm for later-developers (LDCs). These values are those that fit better with the actual 1890-1960 values. Although the difference between actual and fitted values is around 10% for 1910, 1950 and 1960, I admitted no difference in 1850 and 1870, in agreement with Crafts' (1984, p. 447) finding that later-developers tend to have higher agricultural shares than the norm at the same income levels: Portugal was one of the poorest countries, even among this group (see chapter 1). Because the range of possible values is narrow, these assumptions are safe.

Table A.18

Structure of Male Labour Force

	Shares (%)			Total (000)		
Year	Agricul.	Industry	Services	Agricul.	Industry	Services
1850	[68.7]	[17.4]	[13.9]	[656]	[166]	[133]
1870	[69.7]	[16.8]	[13.5]	[761]	[183]	[147]
1890	66.9	18.3	14.8	831	227	184
1900	66.4	18.8	14.8	882	250	196
1911	61.0	21.7	17.3	875	312	248

Notes and sources: For 1850 and 1870, the shares for agriculture are from table A.17; the shares for industry and services were estimated with the further assumption that the ratio share of services/share of industry was the same as in 1890-1911 (roughly 80%). From 1890 the figures are from the population census.

Table A.19

Rates of Growth for Output, Labour and Output per Labour in Agriculture and Industry, 1850-1911
(%; per year)

Period	Output		Labour		Output/Labour	
	Agricul.	Industry	Agricul.	Industry	Agricul.	Industry
1850-1870	-0.26	1.92	0.75	0.49	-1.01	1.43
1870-1890	1.40	2.55	0.44	1.08	0.96	1.47
1890-1900	2.07	3.13	0.60	0.97	1.47	2.16
1900-1911	-0.85	2.65	-0.07	2.03	-0.78	0.62
1870-1900	1.67	2.73	0.49	1.05	1.18	1.68
1870-1911	0.94	2.71	0.34	1.31	0.60	1.40
1850-1900	0.94	2.54	0.60	0.82	0.34	1.72
1850-1911	0.58	2.55	0.48	1.04	0.10	1.51

Sources: Computed from tables A.6, A.13 and A.18. To compute growth rates between comparable years (i.e. peak to peak or trough to trough), the benchmark years (the centre of three year averages) are the following:
Agriculture: 1852, 1870, 1888, 1900. Given that 1912 is a trough year it should be compared with 1861.
Industry: 1851, 1870, 1891, 1900 and 1912.

Table A.20

Compared Rates of Growth for
Agriculture, Industry, Physical Output and GDP,
1850-1911 (%, per year)

Period	Popul.	Physical Prod. Total	Physical Prod. per c.	Justino
	(1)	(2)	(3)	(4)
1850-1870	0.67	0.44	-0.23	0.50
1870-1890	0.81	1.77	0.96	1.15
1890-1900	0.74	2.41	1.67	0.15
1900-1911	0.92	0.28	-0.64	0.33
1870-1900	0.78	2.01	1.23	0.82
1870-1911	0.82	1.51	0.69	0.70
1850-1900	0.74	1.46	0.72	0.69
1850-1911	0.77	1.22	0.45	0.63

Notes and sources:
(1) From table A.1
(2) and (3) Average of agricultural and industrial rates of growth, weighted respectively by the coefficients 0.676 and 0.324 for 1890.
(4) Indirect GDP growth estimated from Justino (1987).

Table A.21

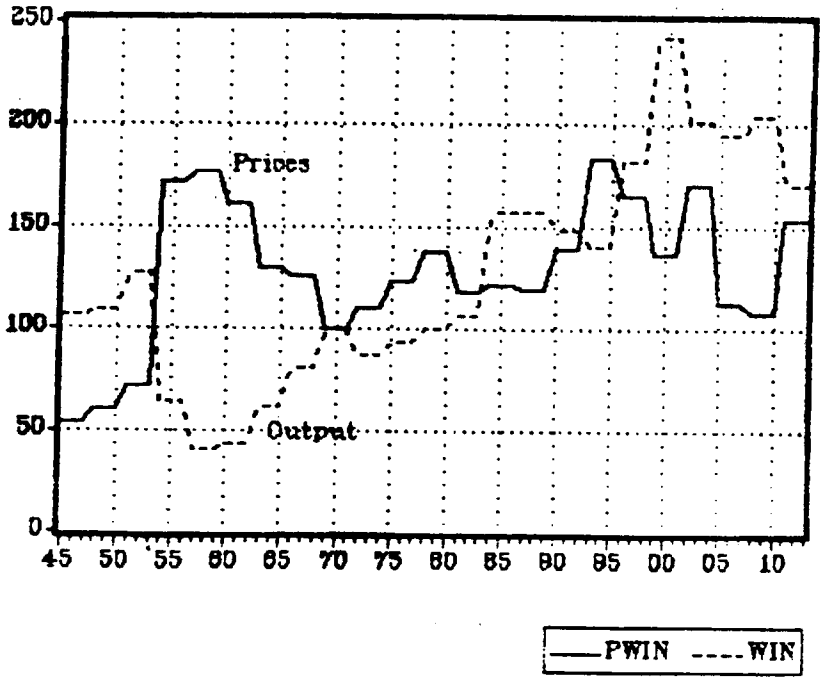
Indexes for Agriculture, Industry and Physical Output
(1900=100)

obs	PAG	PIND	PHY
1846	58.7	NA	NA
1847	58.9	NA	NA
1848	59.2	NA	NA
1849	59.4	NA	NA
1850	60.9	NA	NA
1851	62.4	26.5	52.6
1852	63.9	NA	NA
1853	59.5	NA	NA
1854	55.3	30.1	48.7
1855	51.5	30.5	46.2
1856	50.5	30.9	45.5
1857	49.5	NA	NA
1858	48.6	NA	NA
1859	48.4	NA	NA
1860	48.2	NA	NA
1861	48.0	31.6	43.1
1862	49.0	NA	NA
1863	50.0	NA	NA
1864	51.0	NA	NA
1865	52.5	33.8	48.2
1866	54.2	35.3	49.4
1867	55.8	36.6	50.9
1868	57.5	35.6	51.6
1869	59.2	37.0	53.3
1870	60.9	40.0	56.4
1871	60.2	35.5	53.8
1872	59.5	42.5	55.5
1873	58.8	50.8	58.0
1874	58.6	51.0	56.8
1875	58.4	51.4	56.6
1876	58.2	48.2	54.9
1877	58.9	55.8	57.9
1878	59.7	54.3	57.9
1879	60.5	53.0	58.1
1880	61.8	49.5	57.8
1881	63.2	53.5	60.1
1882	64.6	57.3	62.2
1883	67.9	56.5	64.2
1884	71.3	57.8	66.9
1885	75.0	57.0	69.1
1886	76.0	68.0	73.4
1887	77.1	71.0	75.1
1888	78.2	71.6	76.1
1889	78.5	66.1	74.5
1890	78.7	76.9	78.2
1891	79.0	71.3	76.5
1892	78.8	70.2	76.0
1893	78.7	75.2	77.5
1894	78.5	71.7	76.3
1895	81.3	77.8	80.1

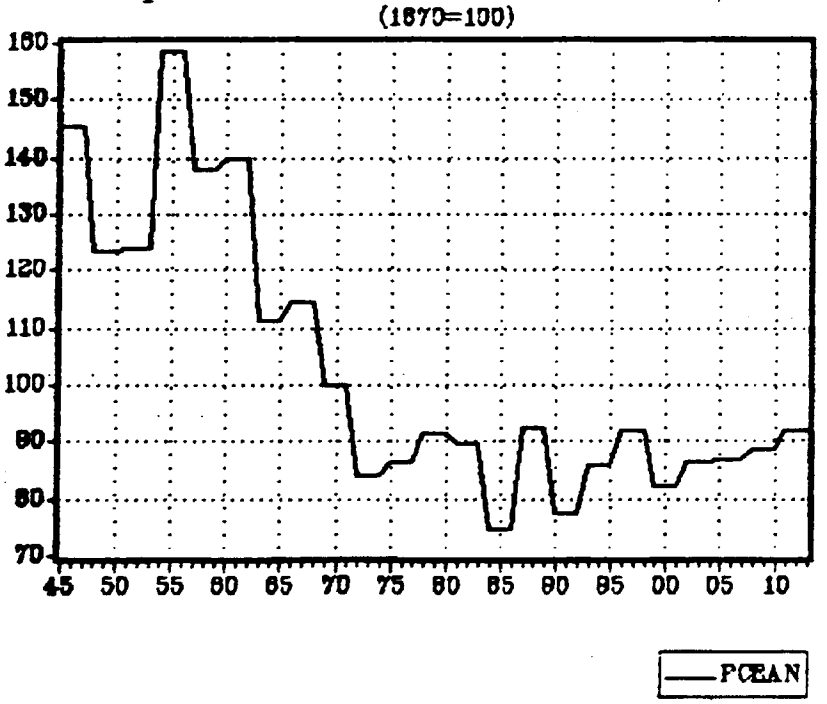
obs	PAG	PIND	PHY
1896	84.1	76.3	81.5
1897	87.0	87.0	87.0
1898	91.2	89.4	90.6
1899	95.5	92.4	94.5
1900	100.0	100.0	100.0
1901	98.9	95.7	97.9
1902	97.9	98.8	98.2
1903	96.9	104.8	99.4
1904	96.7	109.1	100.7
1905	96.4	99.8	97.5
1906	96.2	101.9	98.1
1907	95.1	111.2	100.3
1908	94.0	107.3	98.3
1909	92.9	108.5	97.9
1910	92.0	117.9	100.4
1911	91.1	130.3	103.8
1912	90.3	131.1	103.5
1913	90.3	133.0	104.1

Notes and sources:
PAG: From table A.6, with interpolations.
PIND: Averages of PIL, PIR1 and PIR2 according to weights on table A.14
PHY: Weighted average of PAG and PIND, according to the weights on table A.20

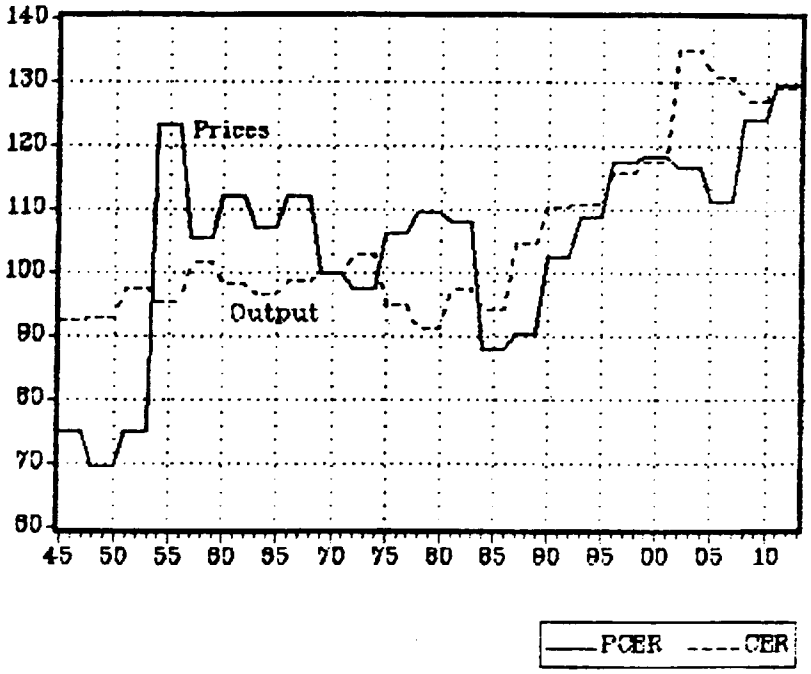
Graph A.1 – Wine: Output and Prices
(1870=100)



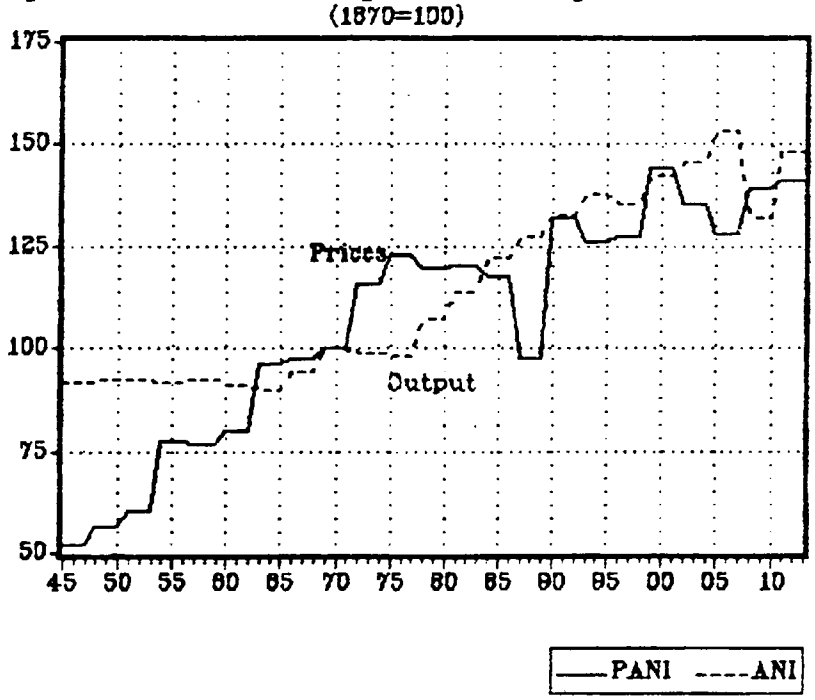
Graph A.2 – Price Relative Cereal/Meat
(1870=100)



Graph A.3 – Cereals: Output and Prices
(1870=100)



Graph A.4 – Animal prods.: Output and Prices
(1870=100)

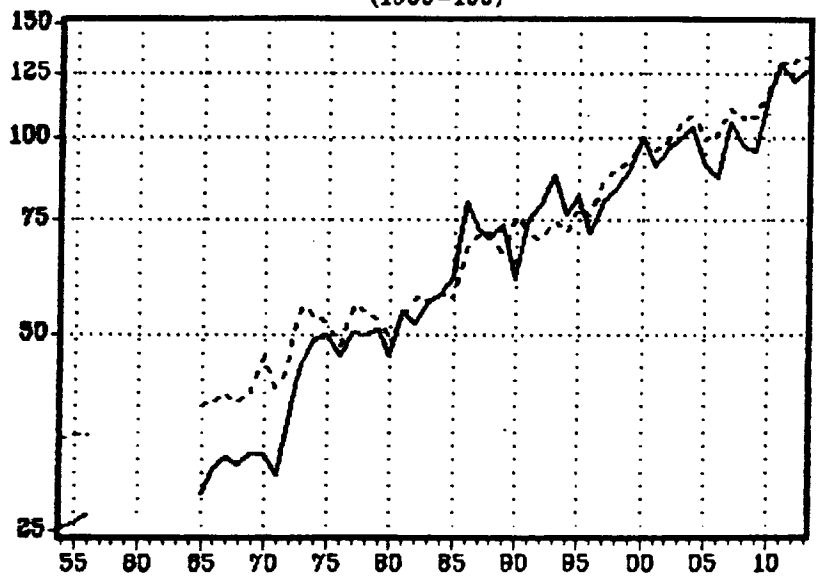


Source: Table A.6 and Justino (1989)

GRAPH A.5

Industrial output

(1900=100)

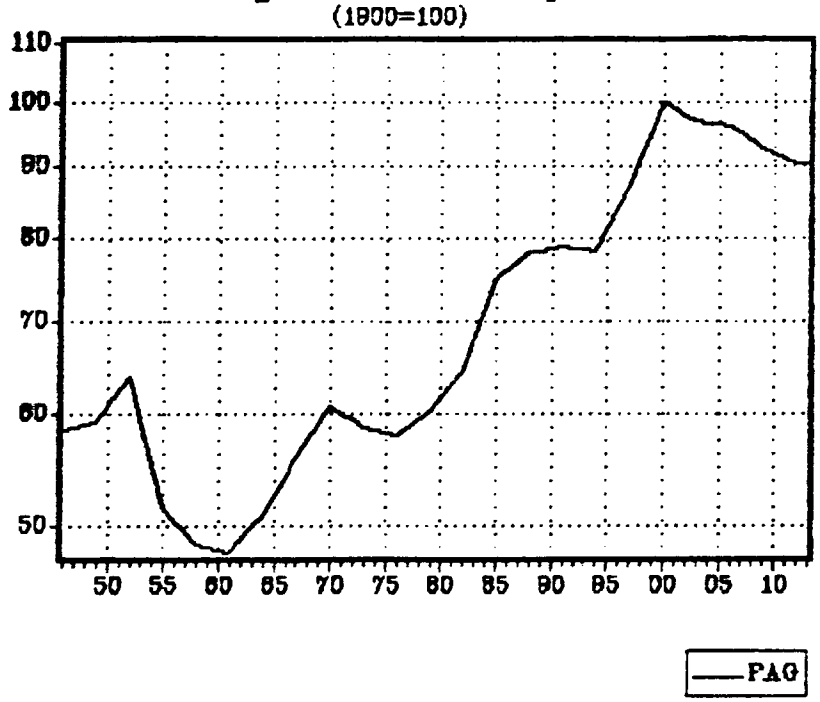


SOURCE: TABLE A.13

GRAPH A.6

Agricultural output

(1900=100)



SOURCE: TABLE A.21

APPENDIX B

NEW VALUES FOR PORTUGUESE FOREIGN TRADE STATISTICS

In the last two or three decades several studies have investigated the accuracy of trade statistics, by comparing data from different pairs of countries.[1] Generally speaking, these studies have shown that exports tend to be undervalued, while imports tend to be overvalued. Furthermore, these studies also conclude that trade flows among countries are most of the times badly recorded, especially in the case of transit countries, like Belgium or the Netherlands, which reexported goods from other

1. These studies followed pioneering works such as that of Zuckermann (1921). Among the most recent revisions of nineteenth century foreign trade statistics, see Don (1968), Prados (1981 and 1986), Degrève (1982), Lains (1986), Pamuk (1987) and Tena (1989). Zuckermann (1921) provides a first complete comparison of World international trade statistics for the years 1909/13, which was criticised by Morgersten (1963), and recently recovered in Federico and Tena (1989). This last work also presents a complete survey on the literature concerning the accuracy of international trade statistics.

Western European countries and their colonies to Central Europe and Britain; and the United States through which ports some trade reached Latin America.

Portuguese trade statistics do not compare badly with those of most countries. Instead, they may be considered rather accurate at least from 1865 onwards, when they start appearing annually. Trade values were established according to the declarations of exporters and importers, and not according to any lists official values, as existed in other countries and which most of the times were not revised regularly.[1] Portuguese trade statistics also recorded the direction of trade according to real origin and destination. But reexports from the African colonies appear separately only after 1880. Trade in bullion and specie is also excluded from the totals after that year. Furthermore, some goods were imported under special conditions, such as railway equipment, and were not registered in the totals; some of the coal imported was then reexported to the coaling stations in Cabo Verde and Madeira. The necessary adjustments were made accordingly.[2]

To check the accuracy of the Portuguese foreign trade statistics I will follow here the standard procedure, which is to compare the values for Portuguese exports and imports in

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1. Export prices declared by traders were however controlled by official tables with minimum prices that were in principle revised quarterly. See Amzalack (1919, p. 41).

2. For further detail see Lains (1986, pp. 411-12).

Portugal's official statistics to the correspondent values recorded by the major trade partners. Such a procedure has several limitations. Firstly, the sample of countries is restricted by the quality or accessibility of information. French statistics, for instance, are not reliable before 1870, whereas trade statistics for Germany are non-existent before 1871, and are reliable only from 1880.[1] Furthermore, the comparability of foreign trade statistics among pairs of countries is rendered difficult by the use of different methods used to register trade flows. These differences include evaluation by official prices or by declared values; registration of real origin and destination or registration according to areas of shipment and delivery; inclusion of transit trade and trade in gold and silver in aggregate trade flows; and the usual distinction between FOB and CIF prices.[2] Inter-country comparisons of trade statistics are also disturbed by smuggling.

Most of the data I shall be using here refers to four Western European countries. Data for trade outside Europe is more difficult to obtain, specially for Latin America. Brazil, Portugal's major trading partner in Latin America, has no safe statistics for exports because of deficient record of

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1. See Giffen (1882, p. 191), Platt (1972, p. 120), and Lewis (1981, Appendix 1), who corrects German's trade figures for 1833-80.

2. See the survey in Degrève (1982, pp. 94-97) of the different country systems.

destinations.[1] The other major Overseas trading area, Portuguese African colonies, do not have independent trade data.

Except for the USA and Brazil, most statistical publications register export values at free on board (FOB) prices, and import values including cost, insurance and freight (CIF). I did not compute specific freight factors for Portugal because fluctuations in international freight rates do not vary significantly. I used an index of freight rates which links North's (1950) index for US Exports from 1842 to 1869, and Cairncross' (1953) index for UK trade from 1870 to 1913. To reduce the strong fluctuations in the American index prior to 1870, which are caused by the Civil War, I used five-year averages of that index. As we could expect, the above two freight indexes are highly correlated. The simple correlation coefficient for the period in which they overlap (1870-1910) is 0.93. The linked index was used to multiply a freight factor for the year 1873, given by British consular report, which puts freight charges of Anglo-Portuguese trade at 7% of the value. I increased this percentage to 10% to take in account the higher rates for the Southern Atlantic freights.[2] The yearly freight conversion

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1. Brazilian exports were often directed to the "Channel", before reaching their final destination, according to market conditions. See Platt (1972, p.122) and Comércio Exterior do Brasil (n.d., p. LXIX).

2. This 10% were estimated as follows: freight rates between Portugal and Brazil were about two times freights between Portugal and Europe, and the South Atlantic accounted for about 1/3 of Portuguese trade. Then:

$$10\% = 2/3 \times 7\% + 1/3 \times 14\% \text{ (approx.)}$$

Freights are from Parliamentary Papers (1873, p. 959).

factor is presented in table B.3 below. It is important to note that the use of international freights imply margins of error of probably not more than 5% of the traded values.

The countries with which Portuguese trade figures are here compared systematically are the United Kingdom, France, Belgium and Germany. Spanish trade figures will be used to make a first estimate of smuggling over the land border. Correction coefficients for trade to and from these countries are defined as the ratio of the value of trade given by the foreign statistics to that given by Portuguese statistics, corrected for freights and converted into pounds sterling at market exchange rates. Thus, Portuguese official values should be multiplied by the coefficients to obtain the "true" values.

Table B.1 shows five-year averages for the correction coefficients regarding the countries above, as well for other countries for which statistics could be found. This table is summarized in table A2.2. Yearly correction coefficients for Great Britain from 1855, plus France and Belgium from 1875, and Germany from 1883, are presented in table B.3.[1] Because it was Portugal's major trade partner throughout the period, special care is given to the computation of correction coefficients for

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1. British Abstracts for Foreign Countries give tables for France in which either exports (1862-1873) to Portugal or imports (1873-1883) from Portugal are not discriminated. I resorted to other sources, but nevertheless I do not have a continuous series before 1875. In the case of Germany the same problem arises before 1883, but in any case statistics for this country previous to 1880 are not reliable, as pointed out above in the text. Given the small weight of trade with these countries in the earlier periods, their exclusion does not affect significantly the results.

the United Kingdom. British statistics, which are certainly among the best before World War I, do have some drawbacks. In fact, not until 1854 did imports and reexports start being evaluated at market values instead of at "official" values, which had been for the greatest part fixed in the seventeenth century (in 1696). Before 1904 exports and imports were registered according to ports of shipment and landing. Only after that date did they start registering the true origin and final destination.

For specific inter-country comparisons more detailed problems arise. British statistics take trade with Portugal proper separately from trade with the Atlantic islands (Azores and Madeira); and trade in bullion and specie as well as reexports were included in the totals. As Portugal is a sea-borne country, its direct trade with Britain is well recorded in British statistics, in opposition to reexports from Portuguese the colonies and the transit trade between Britain and Spain.[1]

The British source for Anglo-Portuguese trade here used are the tables in the *Parliamentary Papers*, where the level of detail is good enough to overcome the problems of compatibility pointed out above. This disaggregate comparison also shows that the errors arise mainly in what evaluations are concerned and not as

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1. The mis-specification of the directions of British trade is less important for sea-borne countries as Portugal. An information regarding 1904, the year when Britain changed the classification from countries of last shipment to countries of consignment (i.e. proper origin), shows that Portugal sent to Britain less than 1.3% of its exports through other countries such as France, Germany or Spain (Parliamentary Papers, 1905, p.424). See also Platt (1972, p. 122). For a general correction of British statistics see Imlah (1958).

much in the record of traded quantities.[1] Two first yearly correction coefficients were computed for Portuguese exports and imports to and from the UK (see table B.3). In the cases of France, Belgium and Germany, the available sources only give trade by totals, disaggregated by major trade partners (as well as totals by major commodity classifications). The estimated individual correction coefficients for each of these countries do not show any regular pattern, nevertheless, the errors tend to compensate. More importantly, the joint index of the three countries is proximate to that for the UK, giving some sort of confidence to our results (see graph B.1).

The available information on the United States of America is not included in the yearly correction coefficient, because comparisons between the two different country sources are not always feasible. For instance, in 1895/99 Portuguese exports to the US, according to US statistics would be 6 times the value given by Portuguese statistics, an error that is due to the fact that US statistics do not distinguish exports from reexports. Cocoa and coffee reexported from Portuguese African colonies through Lisbon appear in US statistics as of Portuguese origin. These reexports increased sharply in the 1890s, and such increase

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1. Given that imports statistics are rather accurate (see below), this concerns only exports. Correction coefficients for values and volumes of Anglo-Portuguese exports are presented in Lains (1986, p. 415).

explains the major differences depicted in table B.1.[1] In the case of Brazil, it was not possible to find enough information for the years prior to 1910.[2] Also because of transit trade, exports from Portugal to Belgium after 1890 appear with large differences in the two sources. In 1910/13 this error reaches an extremely high value because Portuguese reexports in general, and to Belgium in particular, rose considerably. In consequence, I excluded Belgium from the average yearly index in the years after 1910.

We may look now at the correction coefficients for Spain. Contrarily to what happens with the other countries, imports from Spain appear as overvalued in Portuguese statistics, while exports appear as undervalued, for most of the period (see tables B.1 and B.2). This is due to smuggling over the common border: smuggling from Spain to Portugal was registered as Spanish exports in Spain, where no important duties were to be paid, but not as Spanish imports into Portugal, to avoid import tariffs (and vice-versa). The detour from one customs house to the other was rendered possible by the considerable distance between most

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1. According to two US consular reports for 1880 and 1907, trade between North America and Portugal was carried by British vessels, through England. This probably led to some errors on American statistics given that they registered origin as last shipping port. See Commercial Relations (1880, p. 983) and (1907, pp. 469-70), and Amzalak (1919, p. 63).

2. For a comparison of Portuguese and Brazilian statistics for trade between the two countries see also Salgado (1927, pp. 28, 38-39).

of the customs houses on either side of the border.[1] Given that Spanish statistics do not distinguish transit trade and include bullion and specie in the totals, I assumed constant smuggling coefficients according to the available information (see table B.4). The resulting correction of Spanish imports into Portugal is particularly important in what respects the trend after 1893, when a commercial treaty between the two countries reduced trade restrictions: the jump in imports shown by Portuguese official statistics is thus attributed to the legalisation of the smuggling that occurred before that treaty.[2]

After going through the particulars, we can now turn to the analysis of the yearly correction coefficients with which trends of Portuguese trade shall be revised. According to the results summarised in table B.5, correction coefficients for imports fall in the range 0.835 to 1.175, with an average for the years from 1855 to 1913 of just 0.978. The value of imports in Portuguese statistics are thus rather accurate, the small error of undervaluation being compensated by the estimated smuggling from Spain. The case of exports is different, the errors falling in

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1. Most customs houses on the Spanish-Portuguese border were located at more than about five kilometres from the border, as it may be deducted from the maps in Serrão (1986, pp. 289-91). As late as April 1900, the Portuguese parliament had a lively discussion over the initiative of a local clerk, who transferred the customs office to his own village, far from the border and with no road links to it. See Diário da Câmara [...] (4-4-1990).

2. In the beginning of the period, there is evidence of large smuggling of British cotton goods and other to Spain through Portugal. This smuggling appear as exports in Portuguese statistics. If they are taken out, Portuguese exports to Spain are considerably reduced till 1870. See chapter 3, Prados (1984, pp. 129-30) and Lains (1986, p. 395).

the range between 0.954 to 2.352, with an average of 1.439 for 1855-1913. Graph B.2 shows the trends for both coefficients.

After 1891, when Portugal left the gold standard, the high values for the correction coefficient of exports is to a large extent explained by the use in official statistics of the par instead of the market exchange rate, for most of the 1891-1913 period. In some period, though, this practice was not followed. As is mentioned in a British consular report, in April of 1893 the customs house began to use an exchange rate for the pound sterling close to the market value (£ 1 = 5$400) instead of the par rate (4$500), as previously. This is patent in graph B.3, in the shape of a reduction of the correction coefficient deflated by an index for the exchange rate (par value = 100), during the years 1893-1895.[1] The other decline of the curve in the same graph in 1904-1905, may also be attributed to a change of the kind, although for these years I do not have direct evidence.[2]

After accounting for the exchange rate fluctuations, the error in official values for Portuguese exports falls within acceptable boundaries, except for a few years. Until 1886 the correction coefficient varies from 0.910 to 1.393, with an

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1. The change in the exchange rate used by Portuguese customs is mentioned in Diplomatic and Consular Reports [...] (1894, p. 6).

2. Regarding the incorrect valuation of exports see for instance Salgado (1927, pp. 303-5, 397). According to this author, exporters declared the value of their merchandise without taking into account changes in the value of the currency. However, the author uses market exchange rates to convert the values in Portuguese currency into pounds, and in some occasions he uses the par exchange rate but for both imports and exports. See also Salgado (1939).

average of just 1.144. Between 1887 and 1890 the coefficient jumped to an average value of 1.356. This level is maintained until 1908 (see table B.6 and graph B.3), when the values go up again. It should be noted that the fluctuations in the correction coefficient for exports are not caused by variations in its coverage, because the coefficients for the UK, the aggregate for France, Belgium and Germany, and for Spain depict the same patterns.

Although the correction coefficients seem rather trustworthy, care should be taken in estimating growth rates between single years that fall in the periods for which no full explanation for the errors may be provided, namely, the years between 1887 and 1890 and between 1909 and 1913. In any case, the corrected statistics have to be used taking into account the limits of the correction coefficients presented here.

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STATISTISCHES YAHRBUCH FUR DAS DEUTSCHE REICH [editions for 1880, 1895, and 1914], Berlin, 1880, 1895 and 1914.

Table B.1(*)

Portuguese Trade according to Different Sources

1865/69

	EXPORTS				IMPORTS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	2204.2	2398.2	2446.3	1.020	2507.4	2304.6	2342.6	1.016
2-France(≠)	115.3	125.4	254.7	2.030	733.0	673.7	847.2	1.258
3-Belgium	24.5	26.7	43.3	1.624	1.1	1.0	7.5	7.705
4-Germany	41.0	44.6	na		69.6	64.0	na	
5-Spain(+)	281.1	305.8	119.3	0.390	452.8	416.2	1962.2	4.715
6-U.S.(")	34.2	34.2	43.8	1.281	170.3	170.3	164.0	0.963
7-Brazil	632.0	687.6	na		672.3	617.9	na	

(*) For notes and sources see end of table
(≠) Except 1869
(+) 1865 and 1866
Average freight conversion factor: 1.088

1870/74

	EXPORTS				IMPORTS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	3108.2	3437.7	3915.5	1.139	2848.3	2575.3	3015.4	1.171
2-France(*)	69.7	77.1	388.4	5.038	531.3	480.4	547.0	1.139
3-Belgium	47.2	52.2	76.4	1.464	11.0	9.9	54.4	5.470
4-Germany	83.5		na		124.7		na	
5-Spain	371.2	410.5	949.3	2.312	504.6	456.2	1087.6	2.384
6-U.S.	53.2	53.2	89.5	1.682	294.9	294.9	298.9	1.014
7-Brazil	796.2		na		663.3		na	

(*) 1870
Average freight conversion factor: 1.106

Table B.1 (cont.)

1875/79

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	2841.0	3105.2	3585.4	1.155	2894.0	2647.8	2927.3	1.106
2-France	204.2	223.2	373.4	1.673	1133.2	1036.7	902.1	0.870
3-Belgium	45.7	50.0	91.1	1.824	177.1	162.0	180.0	1.111
4-Germany	133.4		na		238.2		na	
5-Spain	283.2	309.5	222.7	0.719	522.7	478.2	1228.4	2.569
6-U.S.	79.2	79.2	101.1	1.277	706.6	706.6	716.1	1.013
7-Brazil	952.8		na		500.4		na	

Average freight conversion factor: 1.093

1880/84

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.(*)	3021.9	3260.6	3598.7	1.104	2629.1	2436.6	2650.9	1.088
2-France	737.5	795.8	782.4	0.983	921.8	854.3	769.7	0.901
3-Belgium	55.9	60.3	89.7	1.487	209.1	193.8	205.7	1.061
4-Germany	206.7		na		621.4		na	
5-Spain	332.4	358.7	305.4	0.852	426.7	395.5	950.3	2.403
6-U.S.	143.9	143.9	206.4	1.434	1167.4	1167.4	968.4	0.830
7-Brazil	1061.1		na		480.4		na	

(*) 1880/82 for exports.
Average freight conversion factor: 1.079

Table B.1 (cont.)

1885/89

	EXPORTS				IMPORTS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1774.2	1882.4	2847.9	1.513	2768.2	2609.0	2656.2	1.018
2-France	1323.5	1404.2	1960.4	1.396	1136.2	1070.8	937.0	0.875
3-Belgium	86.7	92.0	85.4	0.928	315.3	297.2	402.4	1.354
4-Germany	354.1		na		1014.2		na	
5-Spain	251.4	266.7	318.2	1.193	548.2	516.7	1147.0	2.220
6-U.S.	132.8	132.8	276.5	2.082	1024.9	1024.9	878.9	0.858
7-Brazil	928.6		na		433.8		na	

Average freight conversion factor: 1.061

1890/94

	EXPORTS				IMPORTS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1413.6	1487.1	2810.6	1.890	2124.6	2019.6	2323.2	1.150
2-France	207.2	218.0	325.9	1.495	875.9	832.6	788.3	0.947
3-Belgium(*)	146.2	153.8	108.6	0.706	350.1	332.8	438.5	1.318
4-Germany	400.5	421.3	620.7	1.473	866.5	823.7	660.8	0.802
5-Spain(≠)	266.6	280.5	1128.3	4.023	576.3	547.8	1089.8	1.989
6-U.S.	144.1	144.1	399.3	2.771	1113.5	1113.5	981.2	0.881
7-Brazil	1147.3		na		408.6		na	

(*) 1890, 1893 and 1894
(≠) Except 1894 for imports
Average freight conversion factor: 1.052
Average exchange rates to the pound (for currencies not in the gold standard): 5$297 reis; 28.71 pesetas.

Table B.1 (cont.)

1895/99

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1560.8	1629.5	2876.3	1.765	2138.5	2048.4	2294.0	1.120
2-France	125.6	131.1	332.9	2.539	650.2	622.8	520.8	0.836
3-Belgium	112.5	117.5	188.8	1.607	265.3	254.1	285.9	1.125
4-Germany	335.6	350.4	776.1	2.215	957.8	917.4	733.1	0.799
5-Spain	566.2	591.1	1133.6	1.918	634.8	608.0	1343.1	2.209
6-U.S.	80.7	80.7	483.0	5.985	986.4	986.4	669.9	0.679
7-Brazil	1008.8		na		287.0		na	

Average freight conversion factor: 1.044
Average exchange rates to the pound (for currencies not in the gold standard): 6$276 reis; 32.80 pesetas.

1900/04

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1345.2	1400.4	2818.3	2.013	3048.1	2928.1	2921.7	0.998
2-France	144.7	150.6	359.1	2.384	950.8	913.4	805.4	0.882
3-Belgium(*)	135.7	141.3	257.5	1.823	411.5	395.3	481.1	1.217
4-Germany	372.3	387.6	804.5	2.076	1602.5	1534.4	1124.1	0.730
5-Spain	857.0	892.1	1254.1	1.406	918.3	822.1	1199.5	1.360
6-U.S.	110.4	110.4	781.1	7.075	1057.0	1057.0	813.7	0.770
7-Brazil	869.8	941.1	1760.8	1.871	441.4	407.9	392.9	0.963

(*) Except 1902
Average freight conversion factor: 1.041
Average exchange rates to the pound (for currencies not in the gold standard): 5$884 reis; 34.33 pesetas.

Table B.1 (cont.)

1905/09

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1508.4	1571.8	2917.5	1.856	3620.5	3474.6	3299.7	0.950
2-France	155.9	162.4	383.7	2.362	1277.1	1225.6	998.8	0.815
3-Belgium	185.6	193.4	379.8	1.964	473.0	453.9	531.7	1.171
4-Germany	483.6	503.9	750.7	1.490	2097.0	2012.5	1538.6	0.765
5-Spain	1025.0	1068.1	1655.2	1.550	931.6	894.0	1440.5	1.611
6-U.S.	119.3	119.3	1201.9	10.08	1162.5	1162.5	547.3	0.471
7-Brazil	1098.0	1188.0	2132.2	1.795	344.3	318.2	267.4	0.840

Average freight conversion factor: 1.042
Average exchange rates to the pound (for currencies not in the gold standard): 4$881 reis; 29.25 pesetas; 8$850 Brazilian gold reis.

1910/13

	E X P O R T S				I M P O R T S			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Countries	X(P)	X'(P)	X(F)	3/2	M(P)	M'(P)	M(F)	7/6
1-U.K.	1627.6	1705.7	2969.5	1.741	4014.9	3831.0	3885.4	1.014
2-France	250.7	262.7	593.5	2.259	1239.8	1183.0	1166.3	0.986
3-Belgium	213.5	223.7	854.6	3.819	746.8	712.6	743.7	1.044
4-Germany	619.6	649.3	1185.2	1.825	2428.8	2317.6	2044.2	0.882
5-Spain	1021.1	1070.1	2032.6	1.899	864.2	824.6	1982.1	2.404
6-U.S.	199.4	199.4	1365.2	6.846	1483.2	1483.2	658.5	0.444
7-Brazil	1223.9	1341.4	2849.7	2.124	283.6	258.8	214.9	0.830

Average freight conversion factor: 1.048
Average exchange rates to the pound (for currencies not in the gold standard): 5$248 reis; 27.35 pesetas; 8$850 Brazilian gold reis.

Notes:

X and M stand for exports and imports, while P and F refer to Portuguese and Foreign sources, respectively. X' and M' stand for exports plus freight rates and imports minus freight rates.

Correction coefficients in column (4) are defined as the ratio of the value of exports or imports in foreign statistics to the respective value in Portuguese statistics, corrected for freight rates and converted into pound sterlings at market exchange rates.

Sources:

See *References*, Sources for trade of Foreign countries. The greatest problems with the sources concern Belgium, Spain, US and Brazil, after 1890, because these countries include reexports in the aggregate values used in this table. Except for the US and Brazil, exports and imports are valued FOB and CIF, respectively.

Freight conversion factors are estimated from North (1950, p. 549) and Cairncross (1953, p. 176) and the freight factor for Portugal in 1873 from Parliamentary Papers (1873, p. 959) (see text). Values for the United States are not converted because this country's statistics give export values at CIF and imports at FOB prices, respectively. For the case of Brazil, a freight conversion factor double the average was considered.

Par exchange rates for the pound sterling are: 4.5 Portuguese mil-reis; 25.23 French and Belgium francs, Italian lira, and Spanish peseta; 20.26 German mark; and 4.87 US dollars. See Chisholm (1889, p. 484). For the exchange rates outside the gold standard the sources are: Prados (1986, p. 148), Mata (1984), and Brazil [...] (1910, p. 162).

Table B.2

Correction Coefficients: Summary

Exports

	65/69	70/74	75/79	80/84	85/89	90/94	95/99	00/04	05/09	10/13
(1) U.K.	1.02	1.14	1.16	1.10	1.51	1.89	1.76	2.01	1.86	1.74
(2) F+B+G	1.96	3.59	1.70	1.02	1.37	1.33	2.17	2.09	1.76	2.32
(3) Spain	0.39	2.31	0.72	0.85	1.19	4.02	1.92	1.41	1.55	1.90

Imports

	65/69	70/74	75/79	80/84	85/89	90/94	95/99	00/04	05/09	10/13
(1) U.K.	1.02	1.17	1.11	1.09	1.02	1.15	1.12	1.00	0.95	1.01
(2) F+B+G	1.27	1.23	0.90	0.93	0.98	0.95	0.86	0.85	0.83	0.94
(4) Spain	4.72	2.38	2.57	2.40	2.22	1.99	2.21	1.36	1.61	2.40

(2) France, Belgium and Germany
Source: Computed from table B.1.

Table B.3
Yearly Correction Coefficients

obs	CCXUK	CCMUK	CCXBFG	CCMBFG	CCX	CCM
1855	1.228	0.987	NA	NA	1.228	1.144
1856	1.186	0.959	NA	NA	1.186	1.087
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	1.083	0.940	NA	NA	1.083	1.175
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	0.997	0.860	NA	NA	0.997	1.064
1866	0.987	0.882	NA	NA	0.987	1.116
1867	1.060	0.949	NA	NA	1.060	1.166
1868	0.966	0.986	NA	NA	0.966	1.133
1869	1.081	0.899	NA	NA	1.081	1.096
1870	1.015	0.897	NA	NA	1.015	1.012
1871	1.128	0.993	NA	NA	1.128	1.118
1872	1.179	0.899	NA	NA	1.179	1.051
1873	1.136	0.752	NA	NA	1.136	1.043
1874	1.297	0.650	NA	NA	1.297	1.039
1875	1.195	0.914	2.239	0.958	1.286	1.027
1876	1.163	0.855	1.665	0.927	1.248	0.988
1877	1.334	0.826	1.936	0.900	1.419	0.971
1878	1.225	0.808	1.631	0.872	1.280	0.971
1879	0.939	0.865	1.273	0.863	1.200	0.976
1880	1.227	0.886	1.549	1.028	1.289	1.030
1881	1.153	0.888	1.430	0.860	1.235	0.979
1882	0.963	0.898	1.145	0.841	1.015	0.965
1883	1.124	0.816	0.790	0.714	0.980	0.863
1884	1.133	0.793	0.740	0.768	0.954	0.864
1885	1.534	0.968	1.227	0.675	1.370	0.915
1886	1.471	0.976	1.199	0.649	1.301	0.928
1887	1.733	0.884	1.101	0.688	1.413	0.888
1888	1.652	0.837	1.166	0.785	1.415	0.918
1889	1.453	0.833	1.416	1.005	1.437	1.033
1890	1.506	0.895	1.217	0.932	1.408	1.012
1891	1.615	0.825	1.196	0.869	1.468	0.945
1892	1.957	0.718	1.653	0.882	1.867	0.876
1893	1.812	0.712	1.633	0.855	1.749	0.897
1894	1.655	0.735	1.466	0.833	1.586	0.835
1895	1.608	0.807	1.570	0.826	1.595	0.873
1896	1.718	0.799	2.143	0.763	1.853	0.844
1897	1.917	0.733	2.258	0.974	2.029	0.905
1898	2.223	0.844	2.641	0.937	2.352	0.937
1899	1.739	0.823	2.498	0.902	1.970	0.898
1900	1.771	0.791	2.381	0.964	1.976	0.914
1901	1.725	0.808	2.496	0.852	1.963	0.886
1902	1.758	1.038	1.970	0.694	1.823	0.929
1903	1.631	1.016	1.858	0.831	1.703	0.970
1904	1.395	1.013	1.845	0.827	1.562	0.965

obs	CCXUK	CCMUK	CCXBFG	CCMBFG	CCX	CCM
1905	1.121	1.040	1.719	0.786	1.327	0.955
1906	1.252	0.964	1.663	0.796	1.399	0.917
1907	1.283	0.985	1.701	0.826	1.432	0.939
1908	1.529	0.933	1.807	0.881	1.627	0.945
1909	1.590	0.980	1.954	0.879	1.719	0.936
1910	1.910	0.830	2.342	1.093	1.951	0.993
1911	1.686	0.975	1.764	0.980	1.717	1.013
1912	1.700	0.954	2.398	0.880	1.805	0.948
1913	1.925	0.936	2.406	0.897	1.973	0.938

Notes:

(1) and (2) - Correction coefficients for exports to and imports from the UK.

(3) and (4) - Weighted averages of the correction coefficients for France, Belgium (except 1891, 1892, 1896, 1902, for lack of data, and 1910-13, for the reasons pointed in the text) and Germany (from 1883 onwards).

(5) - Correction coefficients for total exports (weighted average of columns (1) and (3)).

(6) - Correction coefficient for total imports (weighted average of columns (2), (4) and the correction coefficient for smuggling from table B.4)

Sources: See table B.1.

Table B.4
Correction Coefficients for Smuggling from Spain

obs	CCMSP	CCMSPA
1855	6.843	3.500
1856	5.610	3.500
1857	NA	NA
1858	NA	NA
1859	NA	NA
1860	NA	NA
1861	3.481	3.500
1862	NA	NA
1863	NA	NA
1864	NA	NA
1865	5.764	3.500
1866	3.662	3.500
1867	NA	3.500
1868	NA	3.500
1869	NA	3.500
1870	NA	2.500
1871	2.016	2.500
1872	NA	2.500
1873	3.582	2.500
1874	2.806	2.500
1875	3.439	2.500
1876	1.824	2.500
1877	2.925	2.500
1878	2.178	2.500
1879	2.480	2.500
1880	2.470	2.500
1881	2.199	2.500
1882	1.937	2.500
1883	2.715	2.500
1884	2.860	2.500
1885	2.584	2.500
1886	2.425	2.500
1887	1.834	2.500
1888	1.808	2.500
1889	2.544	2.500
1890	2.199	2.500
1891	2.496	2.500
1892	3.146	2.500
1893	2.051	2.500
1894	2.107	1.500
1895	1.840	1.500
1896	2.151	1.500
1897	1.714	1.500
1898	1.825	1.500
1899	1.855	1.500
1900	1.584	1.500
1901	1.566	1.500
1902	1.263	1.500
1903	1.346	1.500
1904	1.142	1.500

obs	CCMSP	CCMSPA
1905	1.218	1.500
1906	1.529	1.500
1907	1.653	1.500
1908	1.892	1.500
1909	2.238	1.500
1910	2.865	1.500
1911	2.168	1.500
1912	2.177	1.500
1913	NA	1.500

Notes:

Correction of Spanish imports is mainly a correction for smuggling. Due to differences in definition of trade totals in the statistics of the two countries (see text), the correction coefficient for smuggling is taken as the average trends shown by the proper correction coefficient.

(1) - Correction coefficient for imports from Spain

(2) - Adopted correction coefficient for smuggling from Spain.

Sources: See table B.1

Table B.5

Average Yearly Correction Coefficients

	Exports	Imports
1855-1856	1.207	1.116
1861	1.083	1.175
1865-1869	1.018	1.115
1870-1874	1.151	1.052
1875-1879	1.248	0.987
1880-1884	1.095	0.940
1885-1889	1.387	0.936
1890-1894	1.616	0.913
1895-1899	1.960	0.892
1900-1904	1.805	0.933
1905-1909	1.501	0.944
1910-1913	1.862	0.973
1855-1913	1.439	0.978
Minimum	0.954	0.835
Maximum	2.352	1.175
Standard error	0.349	0.085

Source: Table B.3, columns (3) and (7)

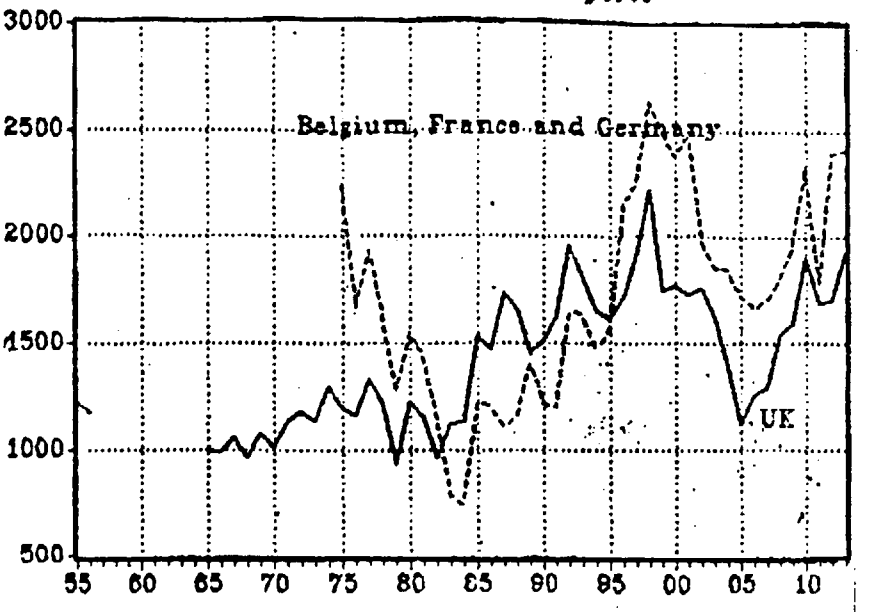
Table B.6
Correction Coefficient for Exports, Exchange Rate Index, and Freight Conversion Factor

obs	CCX	CCXIN	EINDEX	FREIGH
1855	1.228	1.228	1.000	1.086
1856	1.186	1.186	1.000	1.086
1857	NA	NA	1.000	1.086
1858	NA	NA	1.000	1.086
1859	NA	NA	1.000	1.086
1860	NA	NA	1.000	1.095
1861	1.083	1.083	1.000	1.095
1862	NA	NA	1.000	1.095
1863	NA	NA	1.000	1.095
1864	NA	NA	1.000	1.095
1865	0.997	0.997	1.000	1.088
1866	0.987	0.987	1.000	1.088
1867	1.060	1.060	1.000	1.088
1868	0.966	0.966	1.000	1.088
1869	1.081	1.081	1.000	1.088
1870	1.015	1.006	1.009	1.103
1871	1.128	1.128	1.000	1.102
1872	1.179	1.169	1.009	1.102
1873	1.136	1.136	1.000	1.100
1874	1.297	1.297	1.000	1.106
1875	1.286	1.295	0.993	1.097
1876	1.248	1.242	1.004	1.098
1877	1.419	1.413	1.004	1.100
1878	1.280	1.274	1.004	1.088
1879	1.200	1.192	1.007	1.085
1880	1.289	1.295	0.996	1.086
1881	1.235	1.219	1.013	1.088
1882	1.015	1.002	1.013	1.082
1883	0.980	0.967	1.013	1.076
1884	0.954	0.941	1.013	1.066
1885	1.370	1.349	1.016	1.058
1886	1.301	1.298	1.002	1.057
1887	1.413	1.410	1.002	1.057
1888	1.415	1.412	1.002	1.062
1889	1.437	1.434	1.002	1.070
1890	1.408	1.399	1.007	1.062
1891	1.468	1.367	1.074	1.057
1892	1.867	1.465	1.274	1.048
1893	1.749	1.405	1.244	1.046
1894	1.586	1.233	1.287	1.045
1895	1.595	1.260	1.266	1.041
1896	1.853	1.425	1.301	1.044
1897	2.029	1.389	1.461	1.044
1898	2.352	1.489	1.580	1.049
1899	1.970	1.442	1.366	1.044
1900	1.976	1.407	1.404	1.050
1901	1.963	1.384	1.418	1.040
1902	1.823	1.434	1.272	1.039
1903	1.703	1.373	1.240	1.040
1904	1.562	1.299	1.203	1.038

obs	CCX	CCXIN	EINDEX	FREIGH
1905	1.327	1.246	1.065	1.039
1906	1.399	1.374	1.018	1.037
1907	1.432	1.388	1.032	1.038
1908	1.627	1.408	1.155	1.039
1909	1.719	1.492	1.152	1.038
1910	1.951	1.489	1.310	1.039
1911	1.717	1.580	1.086	1.037
1912	1.805	1.633	1.105	1.038
1913	1.973	1.696	1.163	1.039

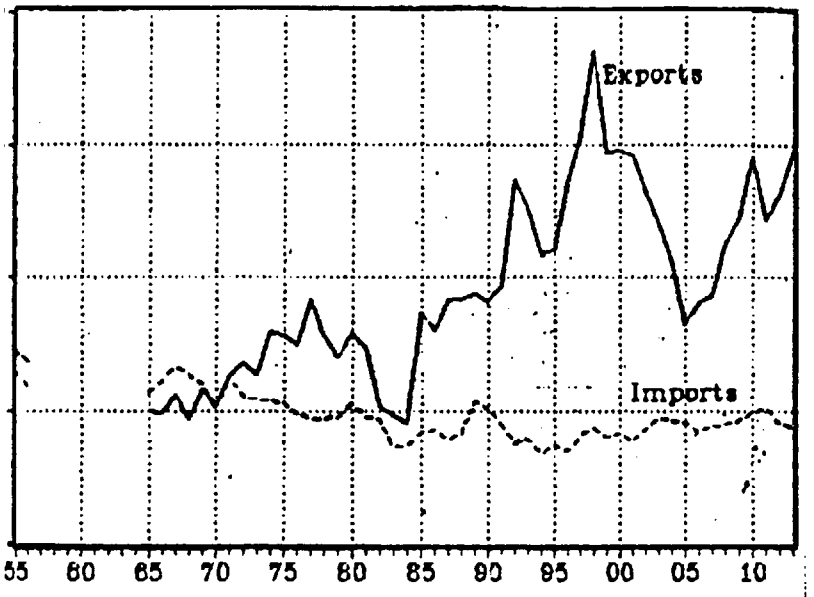
Notes:
(1) Correction coefficient for exports.
(3) Index for the exchange rate of the mil-reis to the pound sterling (4.5 (par value) = 100).
(2) (1)/(3)
(4) Freight conversion factor.
Sources: See table B.1

Correction Coefficients for Exports



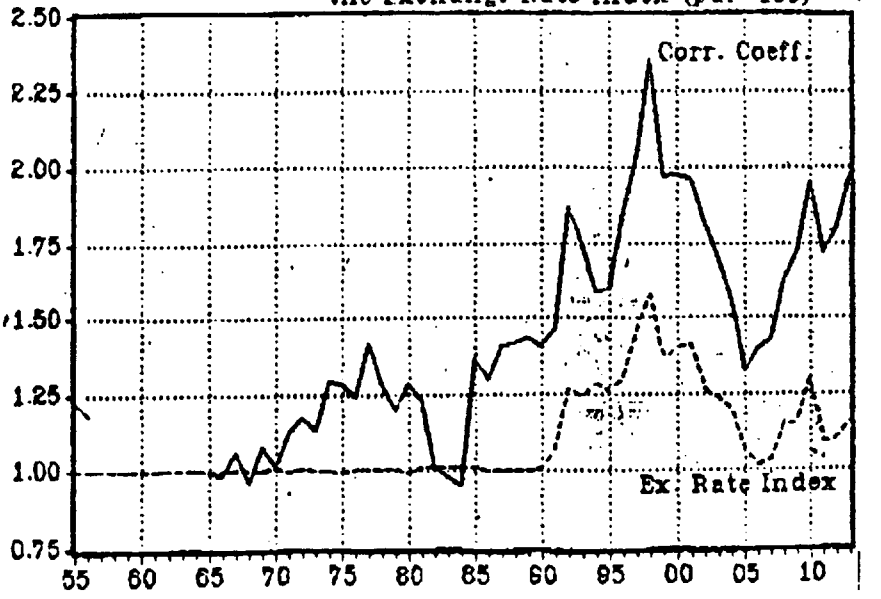
Source: Table B.3

Graph B.2
Correction Coefficients for Exports and Imports



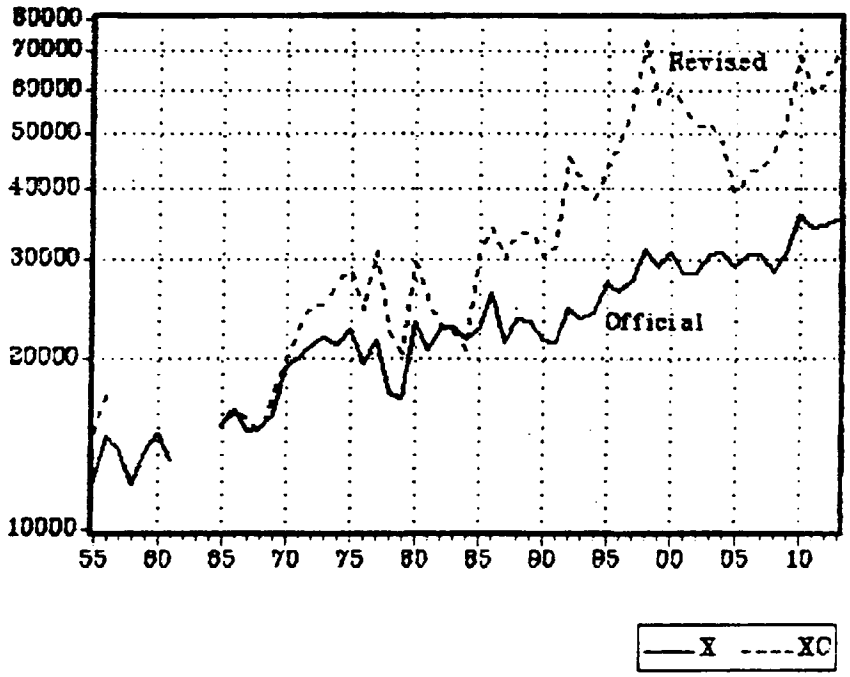
Source: Table B.3

Graph B.3
Correction Coefficient for Exports and the Exchange Rate Index (par=100)

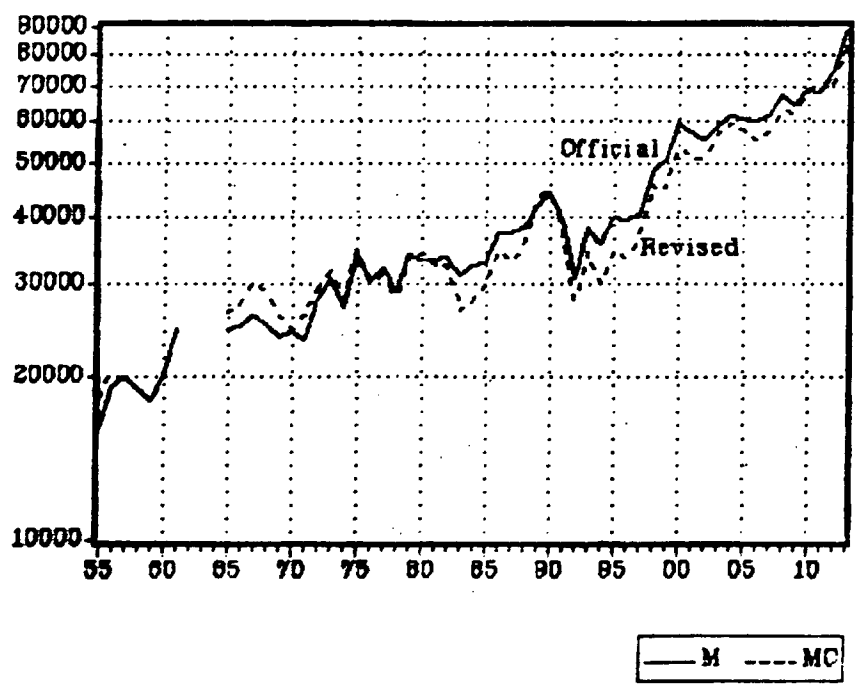


Graphs B.4 - Comparison of official and revised series

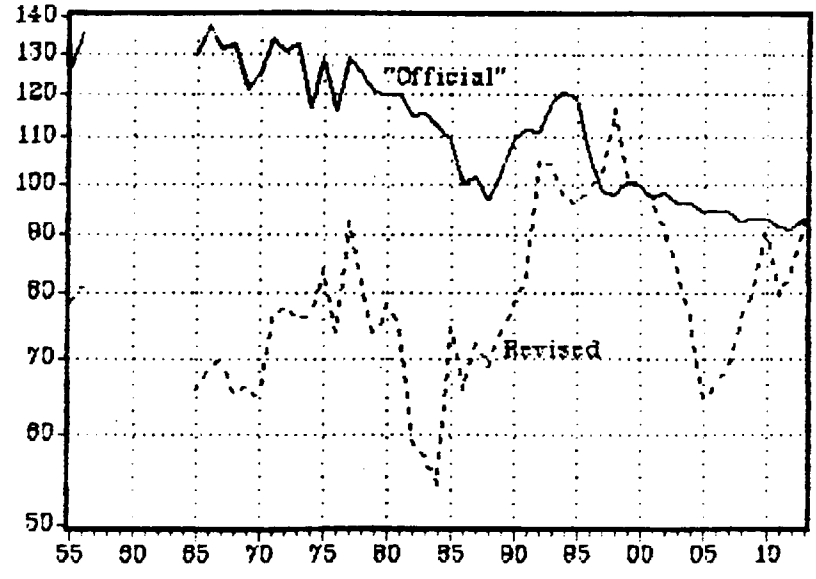
Export value – Official and revised series



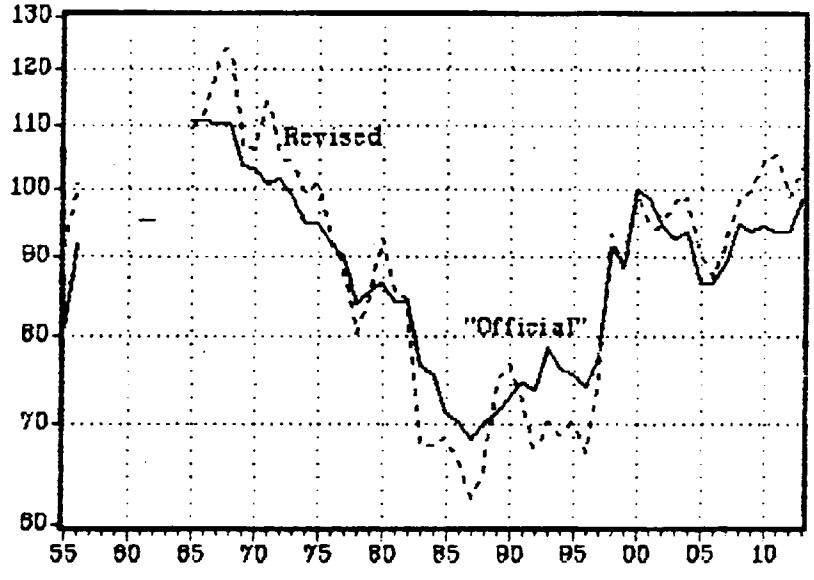
Import values – Official and revised series



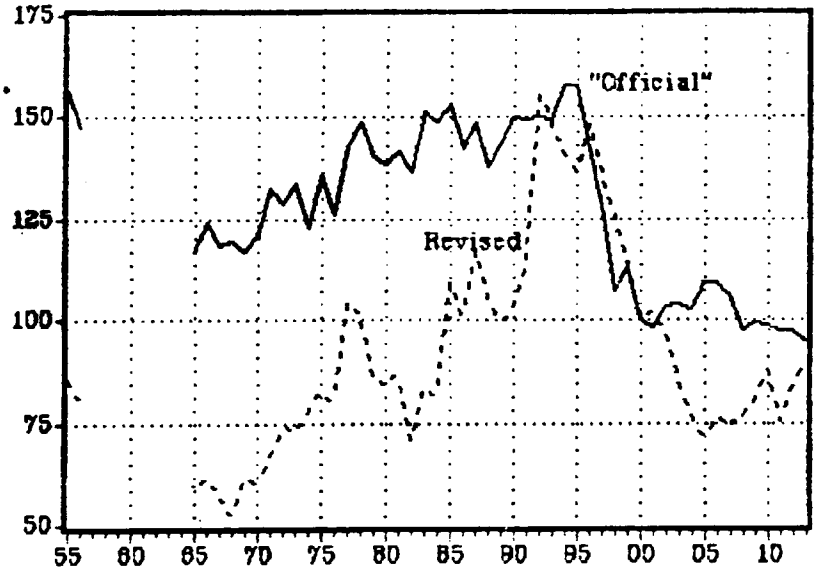
Export prices – "Official" and revised indices



Import prices –"Official" and revised indices



Terms of trade – "Official" and revised inidces



APPENDIX C

DATA FOR PORTUGUESE FOREIGN TRADE

This appendix presents the main aggregate and disaggregate series for Portugal's trade by value and volume according to the official publications, for the years 1842-43, 1848, 1851, 1855-56, 1861 and 1865-1913, as well as the price indexes. Special care is needed in using official statistics after 1891, because exports were evaluated at the par exchange rate, whereas imports were evaluated at the market exchange rate. As a rule of thumb all the disaggregated official series for exports after 1891 should be corrected by multiplying by the exchange rate index (EINDEX). For further details see Appendix B and Lains (1986).

SOURCES

MAPAS GERAIS DO COMÉRCIO de Portugal com as suas possessões ultramarinas e nações estrangeiras, Lisboa: Direcção Geral das Alfândegas e Contribuições Indirectas [1842-1861].

ESTATÍSTICA DO COMÉRCIO de Portugal com as suas possessões ultramarinas e nações estrangeiras, Lisboa: Direcção Geral das Alfândegas e Contribuições Indirectas [1865-1879].

COMÉRCIO DO CONTINENTE do Reino e Ilhas Adjacentes com países estrangeiros e com as províncias portuguesas do ultramar, Lisboa: Conselho Superior das Alfândegas [1880-1896].

COMÉRCIO E NAVEGAÇÃO, Lisboa: Direcção Geral da Estatística e dos Próprios Nacionais [1897-1914].

Other:

MAPAS ESTATÍSTICOS E DO RENDIMENTO, Lisboa: Alfândega Grande de Lisboa, various issues.

MAPAS ESTATÍSTICOS E DO RENDIMENTO, Porto: Alfândega do Porto, various issues.

DATA

Values are expressed in CONTOS DE REIS

Quantities are expressed in TONS, except when otherwise specified

The base year for the indexes is 1900=100

The tables are grouped according to the following headings:

C.1 - Aggregate Values, Volumes and Prices: Exports and Imports
C.2 - Exports and Imports by Classes of Goods
C.3 - Export Series
C.4 - Import Series
C.5 - Exports and Imports by Countries
C.6 - Reexports

C.1

AGGREGATE VALUES, VOLUMES AND PRICES FOR EXPORTS AND IMPORTS

EXPORTS

X - Official values, current prices
XC - Revised values, current prices
XF - Official values, constant prices
XFC - Revised values, constant prices
CCX - Correction coefficient
PX - Price index (Fisher formula)
PXC - Revised price index (Fisher formula)

IMPORTS

M - Official values, current prices
MC - Revised values, current prices
MF - Official values, constant prices
MFC - Revised values, constant prices
CCM - Correction coefficient
PM - Price index (Fisher formula)
PMC - Revised price index (Fisher formula)

TERMS OF TRADE

RT = PX/PM
RTC = PXC/PMC

BULLION AND SPECIE

XOP - Exports of gold and silver
MOP - Imports of gold and silver

obs	X	XC	XF	XFC	CCX
1842	6004.8	NA	6022.9	11902.0	NA
1843	6373.3	NA	8053.2	15914.0	NA
1844	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA
1847	NA	NA	NA	19059.0	NA
1848	7564.4	NA	9644.8	19059.0	NA
1849	7726.0	NA	NA	NA	NA
1850	8416.3	NA	NA	17583.0	NA
1851	7986.5	NA	8897.6	17583.0	NA
1852	6855.4	NA	NA	NA	NA
1853	12315.3	NA	NA	NA	NA
1854	12825.9	NA	NA	NA	NA
1855	12088.9	14844.3	9551.2	18874.2	1.228
1856	14596.6	17310.8	10757.3	21257.7	1.186
1857	13807.6	NA	NA	NA	NA
1858	11971.6	NA	NA	NA	NA
1859	13617.9	NA	NA	NA	NA
1860	14709.8	NA	NA	19148.0	NA
1861	13248.5	14343.2	9689.5	19147.6	1.083
1862	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA
1865	15291.7	15253.0	11751.1	23221.5	0.997
1866	16323.3	16112.3	11830.2	23377.8	0.987
1867	14875.1	15764.7	11353.3	22435.4	1.060
1868	15053.0	14545.6	11374.5	22477.3	0.966
1869	15968.7	17255.6	13179.8	26044.9	1.081
1870	19396.2	19678.2	15488.5	30607.0	1.015
1871	19900.5	22442.2	14863.3	29371.6	1.128
1872	21173.8	24963.5	16192.9	31999.0	1.179
1873	21896.6	24871.5	16544.5	32693.8	1.136
1874	21035.1	27288.8	18055.9	35680.5	1.297
1875	22489.7	28921.0	17401.5	34387.4	1.286
1876	19578.5	24427.2	16853.3	33304.1	1.248
1877	21681.3	30769.3	16807.2	33213.0	1.419
1878	17379.9	22252.4	13899.5	27467.0	1.280
1879	16941.0	20327.2	14078.8	27821.3	1.200
1880	23288.1	30017.8	19406.8	38350.0	1.289
1881	20644.4	25498.7	17254.0	34095.9	1.235
1882	22555.9	22890.5	19660.0	38850.4	1.015
1883	22789.0	22333.9	19691.5	38912.7	0.980
1884	21569.3	20574.6	19200.0	37941.5	0.954
1885	22647.1	31028.5	20701.2	40907.9	1.370
1886	26108.2	33967.8	26197.3	51768.9	1.301
1887	21239.3	30018.6	20884.3	41269.7	1.413
1888	23443.0	33160.7	24265.6	47951.6	1.415
1889	23343.7	33556.6	22785.5	45026.7	1.437
1890	21538.6	30325.1	19662.8	38855.9	1.408
1891	21379.0	31388.9	19175.7	37893.4	1.468

obs	X	XC	XF	XFC	CCX
1892	24631.2	45975.0	22182.3	43834.7	1.867
1893	23407.9	40952.1	19903.0	39330.6	1.749
1894	23923.7	37946.0	19845.5	39216.9	1.586
1895	26961.0	43007.7	22627.8	44715.1	1.595
1896	26139.0	48438.6	24710.7	48831.3	1.853
1897	27311.0	55416.4	27614.8	54570.0	2.029
1898	31124.0	73215.4	31762.4	62766.3	2.352
1899	28804.0	56757.3	28632.2	56580.6	1.970
1900	30931.0	61123.2	30931.0	61123.2	1.976
1901	28281.0	55526.7	29089.7	57484.6	1.963
1902	28435.0	51827.9	28912.1	57133.6	1.823
1903	30603.0	52119.2	31739.3	62720.5	1.703
1904	30712.0	47967.4	31961.7	63160.0	1.562
1905	28969.0	38451.1	30593.5	60456.3	1.327
1906	30593.0	42800.4	32377.0	63980.6	1.399
1907	30410.0	43543.1	32088.2	63410.1	1.432
1908	28377.0	46166.0	30674.5	60616.4	1.627
1909	30880.0	53096.9	33240.0	65686.2	1.719
1910	35724.0	69706.0	38297.6	75680.5	1.951
1911	34065.0	58492.8	37213.2	73537.7	1.717
1912	34317.0	61944.2	37550.1	74203.3	1.805
1913	35287.0	69637.8	37829.1	74754.7	1.973
1914	27148.0	NA	NA	NA	NA

obs	PX	PXC
1842	99.7	NA
1843	79.1	NA
1844	NA	NA
1845	NA	NA
1846	NA	NA
1847	NA	NA
1848	78.4	NA
1849	NA	NA
1850	NA	NA
1851	89.8	NA
1852	NA	NA
1853	NA	NA
1854	NA	NA
1855	126.6	78.6
1856	135.7	81.4
1857	NA	NA
1858	NA	NA
1859	NA	NA
1860	NA	NA
1861	136.7	74.9
1862	NA	NA
1863	NA	NA
1864	NA	NA
1865	130.1	65.7
1866	138.0	68.9
1867	131.0	70.3
1868	132.3	64.7
1869	121.2	66.3
1870	125.2	64.3
1871	133.9	76.4
1872	130.8	78.0
1873	132.4	76.1
1874	116.5	76.5
1875	129.2	84.1
1876	116.2	73.3
1877	129.0	92.6
1878	125.0	81.0
1879	120.3	73.1
1880	120.0	78.3
1881	119.7	74.8
1882	114.7	58.9
1883	115.7	57.4
1884	112.3	54.2
1885	109.4	75.8
1886	99.7	65.6
1887	101.7	72.7
1888	96.6	69.2
1889	102.4	74.5
1890	109.5	78.0
1891	111.5	82.8

obs	PX	PXC
1892	111.0	104.9
1893	117.6	104.1
1894	120.6	96.8
1895	119.2	96.2
1896	105.8	99.2
1897	98.9	101.6
1898	98.0	116.6
1899	100.6	100.3
1900	100.0	100.0
1901	97.2	96.6
1902	98.3	90.7
1903	96.4	83.1
1904	96.1	75.9
1905	94.7	63.6
1906	94.5	66.9
1907	94.8	68.7
1908	92.5	76.2
1909	92.9	80.8
1910	93.3	92.1
1911	91.5	79.5
1912	91.4	83.5
1913	93.3	93.2
1914	0.9	NA

obs	M	MC	MF	MFC	CCM
1842	9822.3	NA	15811.8	18811.8	NA
1843	12308.5	NA	16550.4	16550.4	NA
1844	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA
1848	10740.1	NA	15699.6	15699.6	NA
1849	8948.3	NA	NA	NA	NA
1850	9401.4	NA	NA	NA	NA
1851	12019.9	NA	15537.6	15537.6	NA
1852	9671.6	NA	NA	NA	NA
1853	12138.3	NA	NA	NA	NA
1854	14687.7	NA	NA	NA	NA
1855	16080.6	18393.0	19899.3	20071.5	1.144
1856	19213.1	20888.7	20870.2	20605.9	1.087
1857	20151.9	NA	NA	NA	NA
1858	19262.9	NA	NA	NA	NA
1859	18177.4	NA	NA	NA	NA
1860	20097.3	NA	NA	NA	NA
1861	24717.3	29037.5	25901.0	28164.5	1.175
1862	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA
1865	24804.1	26383.3	22301.8	23999.3	1.064
1866	24943.3	27830.9	22431.0	24712.6	1.116
1867	26236.8	30582.1	23670.9	25309.6	1.166
1868	25409.9	28795.2	22933.1	22954.7	1.133
1869	23926.3	26211.6	23070.4	24474.7	1.096
1870	24324.9	24623.5	23550.1	23140.6	1.012
1871	23665.0	26447.4	23414.5	22939.7	1.118
1872	27901.3	29325.3	27429.5	27904.8	1.051
1873	30667.9	31980.1	30999.6	30686.0	1.043
1874	27014.7	28055.8	28466.5	28266.6	1.039
1875	34116.9	35049.5	35878.5	34584.0	1.027
1876	30487.9	30115.9	33182.3	32457.3	0.988
1877	32260.6	31336.6	35741.9	35468.1	0.971
1878	28834.7	27987.4	34335.2	34864.7	0.971
1879	34105.7	33298.7	39899.0	39229.2	0.976
1880	33212.9	34194.4	38405.3	36768.8	1.030
1881	33425.6	32716.3	39641.4	38498.8	0.979
1882	33625.1	32455.7	39958.5	38355.9	0.965
1883	31187.0	26901.5	40762.0	39604.9	0.863
1884	32555.0	28113.0	43205.0	41540.2	0.864
1885	32729.0	29932.3	46000.0	43693.2	0.915
1886	37252.0	34566.1	53126.1	52361.3	0.928
1887	37157.0	33000.4	54402.6	53140.9	0.888
1888	38082.0	34943.3	54356.3	53467.9	0.918
1889	41843.0	43215.6	58817.8	57746.8	1.033
1890	44305.0	44847.3	60800.1	58577.6	1.012
1891	39509.0	37334.6	53067.8	51544.8	0.945

obs	M	MC	MF	MFC	CCM
1892	30829.0	27010.5	41807.7	40413.5	0.876
1893	38307.0	34343.8	48699.5	48838.2	0.897
1894	35667.0	29785.2	46782.5	43465.6	0.835
1895	39841.0	34780.1	52783.5	49152.1	0.873
1896	39531.0	33376.2	53355.4	50148.1	0.844
1897	40425.0	36573.6	52262.4	48748.5	0.905
1898	48606.0	45567.6	53098.1	48846.5	0.937
1899	50620.0	45473.2	56793.4	51721.5	0.898
1900	59724.0	54568.4	59724.0	54568.5	0.914
1901	57823.0	51239.8	58543.1	54428.9	0.886
1902	55597.0	51651.7	58609.5	54680.2	0.929
1903	58806.0	57055.6	63416.4	58056.7	0.970
1904	62043.0	59866.8	66242.8	60646.5	0.965
1905	60676.0	57954.9	70099.4	64100.7	0.955
1906	60391.0	55382.2	69663.2	63454.0	0.917
1907	61453.0	57703.9	68777.8	62294.2	0.939
1908	67248.0	63540.1	70884.4	64313.1	0.945
1909	64757.0	62349.4	69140.5	62373.2	0.963
1910	69507.0	69006.9	73412.5	66086.9	0.993
1911	68127.0	69015.6	72568.2	65449.4	1.013
1912	74616.0	70730.7	79590.4	71772.8	0.948
1913	88978.0	83485.5	90342.2	80648.5	0.938

obs	PM	PMC
1842	62.1	NA
1843	74.4	NA
1844	NA	NA
1845	NA	NA
1846	NA	NA
1847	NA	NA
1848	68.4	NA
1849	NA	NA
1850	NA	NA
1851	77.4	NA
1852	NA	NA
1853	NA	NA
1854	NA	NA
1855	80.8	91.6
1856	92.1	101.4
1857	NA	NA
1858	NA	NA
1859	NA	NA
1860	NA	NA
1861	95.4	103.1
1862	95.4	NA
1863	NA	NA
1864	NA	NA
1865	111.2	109.9
1866	111.2	112.6
1867	110.8	120.8
1868	110.8	125.4
1869	103.7	107.1
1870	103.3	106.4
1871	101.1	115.3
1872	101.7	105.1
1873	98.9	104.2
1874	94.9	99.3
1875	95.1	101.3
1876	91.9	92.8
1877	90.3	88.4
1878	84.0	80.3
1879	85.5	84.9
1880	86.5	93.0
1881	84.3	85.0
1882	84.2	84.6
1883	76.5	67.9
1884	75.3	67.7
1885	71.2	68.5
1886	70.1	66.0
1887	68.3	62.1
1888	70.1	65.4
1889	71.1	74.8
1890	72.9	76.6
1891	74.4	72.4

obs	PM	PMC
1892	73.7	66.8
1893	78.7	70.3
1894	76.2	68.5
1895	75.5	70.8
1896	74.1	66.6
1897	77.4	75.0
1898	91.5	93.3
1899	89.1	87.9
1900	100.0	100.0
1901	98.8	94.1
1902	94.9	94.5
1903	92.7	98.3
1904	93.7	98.7
1905	86.6	90.4
1906	86.7	87.3
1907	89.3	92.6
1908	94.9	98.8
1909	93.7	100.0
1910	94.7	104.4
1911	93.9	105.4
1912	93.8	98.5
1913	98.5	103.5

obs	RT	RTC
1842	160.5	NA
1843	106.4	NA
1844	NA	NA
1845	NA	NA
1846	NA	NA
1847	NA	NA
1848	114.6	NA
1849	NA	NA
1850	NA	NA
1851	116.0	NA
1852	NA	NA
1853	NA	NA
1854	NA	NA
1855	156.6	85.8
1856	147.4	80.3
1857	NA	NA
1858	NA	NA
1859	NA	NA
1860	NA	NA
1861	143.3	72.7
1862	NA	NA
1863	NA	NA
1864	NA	NA
1865	117.0	59.7
1866	124.1	61.2
1867	118.2	58.2
1868	119.4	51.6
1869	116.8	61.9
1870	121.2	60.4
1871	132.5	66.3
1872	128.5	74.2
1873	133.8	73.0
1874	122.8	77.1
1875	135.9	83.0
1876	126.4	79.0
1877	142.9	104.9
1878	148.9	100.9
1879	140.8	86.1
1880	138.8	84.2
1881	141.9	88.0
1882	136.3	69.6
1883	151.3	84.5
1884	149.1	80.1
1885	153.8	110.7
1886	142.1	99.4
1887	148.9	117.1
1888	137.9	105.8
1889	144.0	99.6
1890	150.3	101.9
1891	149.8	114.4

obs	RT	RTC
1892	150.6	156.9
1893	149.5	148.1
1894	158.1	141.2
1895	157.9	135.9
1896	142.8	149.0
1897	127.9	135.4
1898	107.0	125.0
1899	112.9	114.1
1900	100.0	100.0
1901	98.4	102.6
1902	103.7	96.0
1903	104.0	84.6
1904	102.6	76.9
1905	109.4	70.3
1906	109.0	76.6
1907	106.1	74.1
1908	97.5	77.1
1909	99.2	80.9
1910	98.5	88.2
1911	97.5	75.4
1912	97.5	84.7
1913	94.7	90.0

obs	XOP	MOP
1842	438.4	3.7
1843	527.0	6.0
1844	NA	NA
1845	NA	NA
1846	NA	NA
1847	NA	NA
1848	933.2	65.7
1849	953.1	500.0
1850	1035.2	500.0
1851	214.1	1729.3
1852	183.8	1319.0
1853	1000.0	3024.2
1854	1290.2	3514.2
1855	2288.0	2693.9
1856	1047.0	1238.7
1857	990.3	1300.0
1858	858.7	1200.0
1859	976.8	1176.6
1860	1054.9	2280.6
1861	726.3	1917.6
1862	NA	NA
1863	NA	NA
1864	NA	NA
1865	3887.3	406.3
1866	2099.2	1968.0
1867	1609.9	402.8
1868	2018.2	730.8
1869	470.0	310.8
1870	285.5	1144.2
1871	164.2	3622.0
1872	117.0	1795.6
1873	69.7	3931.2
1874	110.9	1607.1
1875	117.0	2598.3
1876	1682.2	4546.1
1877	1511.3	780.5
1878	1890.1	3591.6
1879	2628.2	1244.5
1880	55.9	2617.5
1881	125.4	3007.5
1882	2604.3	3454.6
1883	469.9	3973.0
1884	294.6	2787.0
1885	846.8	4177.0
1886	22.2	9442.0
1887	5.4	5031.0
1888	621.2	6685.0
1889	1987.6	10462.0
1890	10538.8	14533.0
1891	29803.7	8269.0

obs	XOP	MOP
1892	9345.3	3761.0
1893	5929.5	1530.0
1894	3883.9	826.0
1895	2308.0	1143.0
1896	3737.0	1285.0
1897	2196.0	257.0
1898	2079.0	2196.0
1899	1216.0	898.0
1900	1635.0	482.0
1901	1382.0	370.0
1902	1072.0	400.0
1903	1298.0	498.0
1904	728.0	444.0
1905	504.0	595.0
1906	348.0	667.0
1907	927.0	285.0
1908	1604.0	293.0
1909	920.0	1886.0
1910	614.0	617.0
1911	417.0	954.0
1912	641.0	1072.0
1913	1398.0	963.0

C.2

EXPORTS AND IMPORTS BY CLASSES OF GOODS

EXPORTS

VXI - Raw materials
VXII - Foodstuffs
VXIII - Processed foodstuffs
VXIV - Manufactures
XOUT - Other
XTOT = X

IMPORTS

VXI - Foodstuffs and tobacco
VXII - Raw materials
VXIII - Intermediate goods
VXIV - Manufactures
MOUT - Other
M = M

obs	VXI	VXII	VXIII	VXIV	XOUT	XTOT
1842	298.3	568.2	3284.7	1041.4	812.2	6004.8
1843	314.8	662.9	3308.7	1205.3	881.6	6373.3
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	396.1	1321.2	4212.4	653.6	981.1	7564.4
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	585.4	1197.1	4533.9	696.2	973.9	7986.5
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	584.2	1729.4	6555.4	972.7	2247.2	12088.9
1856	998.0	1853.8	8987.2	952.1	1805.5	14596.6
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	1786.2	2451.1	6572.8	823.9	1614.5	13248.5
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	3095.7	1694.0	8073.4	667.3	1761.3	15291.7
1866	3094.0	2013.7	8504.7	771.5	1939.4	16323.3
1867	2452.3	2433.3	7523.3	652.0	1814.2	14875.1
1868	2491.6	2814.4	7405.4	653.1	1688.5	15053.0
1869	3131.3	2710.5	7196.8	735.2	2194.9	15968.7
1870	2994.4	3758.7	9051.8	832.4	2758.9	19396.2
1871	3317.5	3791.0	9187.1	903.8	2701.1	19900.5
1872	4192.3	3314.0	10321.2	889.9	2456.4	21173.8
1873	4322.9	4031.9	9587.5	1017.3	2937.0	21896.6
1874	3785.4	3849.0	9725.2	1018.5	2657.1	21035.2
1875	3321.5	3494.2	11701.1	1358.3	2614.6	22489.7
1876	2696.1	2998.5	10841.7	934.4	2107.8	19578.5
1877	3708.4	3028.5	11787.9	909.8	2246.7	21681.3
1878	3634.6	3007.9	7713.5	782.7	2241.2	17379.9
1879	3403.9	2892.2	7360.6	834.1	2450.2	16941.0
1880	5514.3	3717.6	9931.7	1151.8	2972.7	23288.1
1881	3818.3	2807.8	10130.7	1017.0	2870.6	20644.4
1882	4198.9	3735.4	10722.8	931.5	2967.3	22555.9
1883	3756.5	3522.0	11673.2	830.7	3006.6	22789.0
1884	3470.4	3024.0	11398.9	1048.5	2627.5	21569.3
1885	3076.5	1972.2	14219.4	931.6	2447.4	22647.1
1886	3260.1	1915.8	17805.6	821.1	2305.6	26108.2
1887	3337.9	2237.4	12447.2	868.8	2348.0	21239.3
1888	3324.9	2487.4	14169.3	1091.5	2369.9	23443.0
1889	3823.0	2366.5	13309.3	1240.1	2604.8	23343.7
1890	3988.0	1955.2	12163.4	1101.3	2330.7	21538.6
1891	3859.6	1679.3	12523.1	1061.8	2255.2	21379.0

obs	VXI	VXII	VXIII	VXIV	XOUT	XTOT
1892	3864.9	1709.4	14728.4	1252.7	3075.8	24631.2
1893	4283.1	1680.8	12594.7	1648.3	3201.0	23407.9
1894	4984.6	2179.9	10901.1	1818.9	4039.2	23923.7
1895	5123.0	1930.1	13085.0	2178.0	4644.9	26961.0
1896	4310.0	1747.1	12737.0	2278.0	5066.9	26139.0
1897	4311.0	2366.3	12308.0	2525.0	5800.7	27311.0
1898	3868.0	3093.1	13781.0	3714.0	6667.9	31124.0
1899	3596.0	1952.2	12869.0	3862.0	6524.8	28804.0
1900	4001.0	2141.1	12885.0	3753.0	8150.9	30931.0
1901	4368.0	2144.1	11843.0	2289.0	7636.9	28281.0
1902	4063.0	2231.0	12737.0	1971.0	7433.0	28435.0
1903	4167.0	2270.0	12680.0	2879.0	8607.0	30603.0
1904	4496.0	2220.1	11712.0	3104.0	9179.9	30712.0
1905	4057.2	1905.1	12941.0	2822.0	7243.7	28969.0
1906	4800.0	2082.1	13242.0	2687.0	7781.9	30593.0
1907	4763.0	1979.1	12775.0	2733.0	8159.9	30410.0
1908	4236.0	1778.3	11776.0	2286.0	8300.7	28377.0
1909	4320.0	2133.1	12150.0	3121.0	9155.9	30880.0
1910	4664.0	2378.0	15327.0	3960.0	9395.0	35724.0
1911	4307.0	2618.1	15146.0	2554.0	9439.9	34065.0
1912	4910.2	2022.2	16108.0	2206.0	9070.6	34317.0
1913	5403.0	2585.0	15597.0	2179.0	9523.0	35287.0
1914	4207.0	1743.0	12691.0	1870.0	6637.0	27148.0

obs	VMI	VMII	VMIII	VMIV	VMOUT	M
1842	2218.4	1224.1	1034.8	3430.6	1914.4	9822.3
1843	3146.3	1629.1	1298.1	4809.0	1426.0	12308.5
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	2526.3	1404.0	1425.0	3956.6	1428.2	10740.1
1849	NA	NA	NA	NA	NA	8948.3
1850	NA	NA	NA	NA	NA	9401.4
1851	3318.7	1566.7	1602.4	4054.0	1478.1	12019.9
1852	NA	NA	NA	NA	NA	9671.6
1853	NA	NA	NA	NA	NA	12138.3
1854	NA	NA	NA	NA	NA	14687.7
1855	4245.8	2246.4	1692.9	5144.2	2751.3	16080.6
1856	7305.7	2170.1	1779.2	4716.7	3241.4	19213.1
1857	NA	NA	NA	NA	NA	20151.9
1858	NA	NA	NA	NA	NA	19262.9
1859	NA	NA	NA	NA	NA	18177.4
1860	NA	NA	NA	NA	NA	20097.3
1861	6536.3	3123.3	2355.9	5995.5	6706.3	24717.3
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	8926.1	2805.9	1912.2	6779.0	4380.9	24804.1
1866	8327.9	3358.2	1842.8	7486.5	3927.9	24943.3
1867	9315.7	3671.3	2068.5	6762.9	4418.4	26236.8
1868	9407.2	3265.7	1673.0	6041.8	5022.2	25409.9
1869	7961.6	3132.3	1708.7	5961.4	5162.3	23926.3
1870	9793.6	3801.2	1912.8	6448.5	2368.8	24324.9
1871	7900.5	3662.6	2157.5	6593.6	3350.8	23665.0
1872	8958.2	3895.0	2481.7	8503.7	4062.7	27901.3
1873	8355.4	5154.2	3298.0	8819.7	5040.6	30667.9
1874	8152.7	4100.3	3755.2	7316.9	3689.6	27014.7
1875	11263.6	5873.0	3395.2	9232.6	4352.5	34116.9
1876	12474.4	3836.1	2722.4	8143.7	3311.3	30487.9
1877	11128.8	4675.5	2708.8	7299.1	6448.4	32260.6
1878	11647.8	4224.3	2345.7	6698.1	3918.8	28834.7
1879	13844.0	4190.2	2175.8	6634.5	7261.2	34105.7
1880	11552.2	4723.5	2720.3	7908.1	6308.8	33212.9
1881	12101.4	4536.7	2677.6	7548.0	6561.9	33425.6
1882	13393.7	4797.5	2827.0	6660.3	5946.6	33625.1
1883	11140.2	4891.0	2772.5	6528.0	5855.3	31187.0
1884	11695.7	4997.2	2851.3	6888.3	6122.5	32555.0
1885	10923.4	4871.1	3349.2	7181.3	6404.0	32729.0
1886	12132.0	6250.6	3445.9	7844.0	7579.5	37252.0
1887	11831.8	5407.0	3862.4	8149.0	7906.8	37157.0
1888	11444.5	5765.4	4101.9	8522.2	8248.0	38082.0
1889	11490.8	6269.9	4539.1	9737.6	9805.6	41843.0
1890	11692.2	7287.8	4330.7	10165.3	10829.0	44305.0
1891	11821.3	6474.7	3984.9	8270.1	8958.0	39509.0

obs	VMI	VMII	VMIII	VMIV	VMOUT	M
1892	10651.3	6372.7	3588.6	4228.6	5987.8	30829.0
1893	12761.0	8184.7	4710.5	5461.2	7189.6	38307.0
1894	11615.6	7760.3	3884.9	5091.8	7314.4	35667.0
1895	14179.6	7826.7	4234.2	5605.1	7995.4	39841.0
1896	13460.0	7590.5	4419.4	5652.2	8408.9	39531.0
1897	15038.0	8110.0	4250.2	5820.0	7206.8	40425.0
1898	14352.0	11076.0	5766.9	7017.0	10394.1	48606.0
1899	15058.0	11614.0	6077.2	7126.0	10744.8	50620.0
1900	14424.0	15741.0	7468.4	8079.0	14011.6	59724.0
1901	15364.0	14812.0	6736.0	8829.0	12082.0	57823.0
1902	13703.0	15154.0	6760.0	8166.0	11814.0	55597.0
1903	15540.0	14660.0	7548.0	8884.0	12174.0	58806.0
1904	17423.0	14345.0	7876.0	9215.0	13184.0	62043.0
1905	19074.0	12179.0	7062.0	8692.0	13671.0	60678.0
1906	16298.0	12409.0	7700.0	9139.0	14845.0	60391.0
1907	13477.0	14943.0	7698.0	9737.0	15598.0	61453.0
1908	21467.0	14652.0	7761.0	9865.0	13503.0	67248.0
1909	20382.0	14175.0	7863.0	8828.0	13509.0	64757.0
1910	18070.0	17058.0	8427.0	10122.0	15830.0	69507.0
1911	14347.0	18029.0	9176.0	10308.0	16267.0	68127.0
1912	19119.0	17954.0	10079.0	10956.0	16508.0	74616.0
1913	24945.0	18919.0	10981.0	12195.0	21938.0	88978.0
1914	20063.0	15679.0	8649.0	9849.0	15091.0	69331.0

EXPORT SERIES

1	Raw hides and skins	
2	Raw wax	
3	Raw wool	
(100	Raw silk)	
4	Raw cork	
5	Minerals	
	5a Antimony	
	5b Copper	
	5c Manganese	
	5d Iron	
6	Cattle	(units)
7	Sardines	
(101	Wheat)	
(102	Corn)	
8	Oranges	(000 units)
9	Almonds	
10	Figs	
11	Potatoes, onions and dry vegetables	
	11a Dry vegetables	
	11b Potatoes	
	11c Onions	
12	Salt	(000 tons)
13	Canned fish	
14	Flour	
(103	Fruit preserves)	
15	Olive oil	
16	Port wine	(000 litres)
17	Madeira wine	(000 litres)
18	Common wine	(000 litres)
19	Textile manufactures	
	19a Woollens	
	19b Silks	
	19c Cottons	
	19d Linens	
(104	Hats)	(units)
20	Footwear	(pairs)
21	Corks	
(105	Chinaware)	
(106	Books)	
(107	Ropes)	
(108	Tools and machinery for industry)	
22	Iron manufactures	
23	Other	

VALUES

obs	VX1	VX2	VX3	VX4	VX5	VX6
1842	29.7	88.6	84.3	95.7	0.0	6.3
1843	5.7	96.5	75.0	137.6	0.0	7.5
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	22.6	81.1	110.7	181.7	0.0	64.9
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	6.9	124.4	200.1	254.0	0.0	24.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	28.9	152.1	132.0	271.2	0.0	172.8
1856	33.6	379.3	227.0	355.0	0.0	252.0
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	32.8	437.2	225.2	421.4	650.0	515.3
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	57.1	625.6	428.6	515.3	1320.0	391.2
1866	61.8	653.5	530.5	534.7	1279.0	459.4
1867	81.8	447.1	237.2	621.7	1003.0	535.7
1868	101.1	637.1	210.2	562.7	886.0	751.8
1869	111.5	698.3	316.7	584.4	1347.0	1065.5
1870	86.0	262.0	241.8	594.2	1769.0	1891.0
1871	100.9	764.6	497.6	681.0	1185.0	1762.4
1872	70.8	817.6	360.5	1010.7	1891.0	1254.0
1873	117.9	583.1	382.7	963.8	2223.0	1386.3
1874	150.1	650.8	217.0	1030.1	1719.0	1072.5
1875	96.4	439.3	225.3	790.6	1761.0	1799.2
1876	184.5	780.0	201.5	784.2	722.0	1242.2
1877	167.8	524.9	251.5	952.4	1788.0	1262.9
1878	166.8	478.5	224.6	1081.2	1668.0	1293.9
1879	148.1	1018.0	169.9	1036.8	1024.0	1354.5
1880	145.2	604.7	381.2	2355.7	2009.0	1349.7
1881	149.6	104.1	198.0	1734.4	1615.0	1079.6
1882	233.1	117.8	220.7	2137.3	1478.0	2079.3
1883	105.9	92.1	203.3	1958.0	1384.0	2018.7
1884	109.7	80.0	133.8	1978.3	1163.0	1702.0
1885	92.3	79.9	149.3	2097.3	649.0	856.7
1886	99.8	91.0	155.2	2072.3	825.0	556.8
1887	119.7	62.5	183.7	2052.7	909.0	555.6
1888	176.3	59.8	199.0	1812.3	1066.0	908.2
1889	218.0	39.6	202.8	2048.7	1301.0	651.8
1890	199.5	34.8	142.9	2290.4	1308.0	414.7
1891	189.4	44.0	135.1	2236.9	1242.0	181.3

obs	VX1	VX2	VX3	VX4	VX5	VX6
1892	88.6	47.1	161.3	2190.0	1368.0	132.3
1893	129.4	27.8	159.5	2167.0	1788.0	18.3
1894	149.2	93.3	191.9	2224.2	2316.0	597.2
1895	249.0	85.0	186.0	2704.0	1884.0	622.0
1896	206.0	41.0	219.0	2677.0	1162.0	410.0
1897	292.0	113.0	251.0	2854.0	798.0	904.0
1898	308.0	174.0	151.0	2436.0	796.0	656.0
1899	287.0	85.0	155.0	2075.0	988.0	355.0
1900	243.0	122.0	135.0	2257.0	1239.0	468.0
1901	242.0	125.0	201.0	2490.0	1303.0	494.0
1902	180.0	95.0	157.0	2395.0	1232.0	484.0
1903	186.0	101.0	155.0	2604.0	1120.0	662.0
1904	265.0	188.0	145.0	2767.0	1131.0	801.0
1905	299.0	79.0	151.0	2446.0	1082.0	494.0
1906	334.0	115.0	177.0	2983.0	1183.0	636.0
1907	242.0	88.0	92.0	3095.0	1242.0	385.0
1908	304.0	121.0	79.0	2595.0	1130.0	487.0
1909	355.0	104.0	189.0	2752.0	912.0	449.0
1910	278.0	87.0	155.0	3195.0	947.0	417.0
1911	210.0	136.0	107.0	2959.0	894.0	565.0
1912	265.0	192.0	139.0	3173.0	1141.0	400.0
1913	310.0	170.0	113.0	3551.0	1258.0	833.0
1914	268.0	110.0	138.0	2780.0	911.0	346.0

VALUE

obs	VX7	VX8	VX9	VX10	VX11	VX12
1842	0.0	287.1	46.4	75.1	38.0	113.1
1843	0.0	380.9	22.0	85.0	47.0	120.2
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	145.5	506.9	39.7	83.6	65.0	224.1
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	87.8	531.4	66.8	112.9	74.0	172.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	43.6	674.9	44.3	110.1	129.0	391.3
1856	95.5	739.9	20.5	132.8	125.0	365.3
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	77.7	757.9	56.3	203.0	327.0	326.8
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	44.7	600.8	56.5	182.3	194.0	215.7
1866	96.5	655.7	82.2	214.2	240.0	216.2
1867	87.2	530.5	158.3	234.6	277.0	308.2
1868	85.2	584.9	129.8	323.3	242.0	302.0
1869	69.8	572.9	106.4	299.5	320.0	270.8
1870	131.7	738.1	80.8	237.5	362.0	280.7
1871	96.8	627.4	101.1	431.7	510.0	230.4
1872	127.0	736.8	104.5	390.6	357.0	239.0
1873	188.9	887.4	109.7	470.9	448.0	364.3
1874	154.8	922.3	100.1	355.0	530.0	601.5
1875	173.8	501.6	71.8	160.4	495.0	282.4
1876	143.0	556.9	64.9	313.0	420.0	254.4
1877	0.0	447.7	227.9	234.1	617.0	220.2
1878	83.4	468.9	91.5	199.6	670.0	182.0
1879	123.8	187.7	0.0	361.6	576.0	279.7
1880	202.4	378.6	222.3	445.6	748.0	300.7
1881	123.9	346.6	78.0	506.8	469.0	199.9
1882	128.9	409.4	138.7	238.8	562.0	167.8
1883	235.4	195.9	91.8	364.6	332.0	279.0
1884	284.8	181.0	106.0	216.8	355.0	175.4
1885	109.7	164.9	97.8	271.1	350.0	120.8
1886	187.2	143.5	154.3	360.2	337.0	175.4
1887	220.3	97.1	102.4	531.3	449.0	275.9
1888	236.0	81.5	141.6	388.1	468.0	259.5
1889	196.9	102.0	243.8	365.8	516.0	285.2
1890	197.6	67.2	209.4	381.7	515.0	166.8
1891	225.9	54.4	175.2	209.2	529.0	183.5

obs	VX7	VX8	VX9	VX10	VX11	VX12
1892	241.6	65.7	119.1	262.3	609.0	153.3
1893	176.3	63.9	248.5	190.6	811.0	167.3
1894	184.5	69.3	292.0	313.0	567.0	152.8
1895	170.0	56.0	83.0	327.0	542.0	128.0
1896	86.0	71.0	258.0	283.0	528.0	96.0
1897	193.0	55.0	171.0	246.0	630.0	159.0
1898	252.0	73.0	482.0	396.0	933.0	165.0
1899	168.0	48.0	265.0	233.0	725.0	140.0
1900	128.0	64.0	354.0	275.0	683.0	148.0
1901	196.0	42.0	154.0	311.0	748.0	179.0
1902	302.0	33.0	168.0	348.0	712.0	161.0
1903	198.0	23.0	380.0	185.0	667.0	120.0
1904	220.0	9.0	248.0	205.0	597.0	107.0
1905	261.0	17.0	358.0	147.0	517.0	87.0
1906	322.0	9.0	241.0	174.0	532.0	114.0
1907	327.0	7.0	549.0	95.0	464.0	126.0
1908	339.0	9.0	263.0	97.0	423.0	132.0
1909	438.0	7.0	455.0	151.0	473.0	130.0
1910	580.0	3.0	465.0	218.0	543.0	125.0
1911	731.0	4.0	448.0	221.0	526.0	102.0
1912	748.0	2.0	119.0	168.0	520.0	50.0
1913	625.0	4.0	418.0	149.0	494.0	45.0
1914	360.0	3.0	169.0	177.0	620.0	49.0

VALUES

obs	VX13	VX14	VX15	VX16	VX17	VX18
1842	0.0	0.2	212.9	2624.5	22.3	424.8
1843	0.0	0.0	144.3	1955.6	864.1	344.7
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	0.0	0.0	192.8	2943.3	533.9	542.4
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	0.0	4.2	176.7	2646.2	744.1	946.9
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	0.0	207.7	238.9	4474.4	296.1	1318.0
1856	0.0	57.4	1336.0	5953.9	232.0	1385.5
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	0.0	78.8	687.6	4282.0	296.4	1178.6
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	4.6	19.4	485.9	6470.6	141.7	911.9
1866	3.3	27.8	827.4	6478.4	157.3	966.3
1867	7.4	35.3	1233.8	5185.8	169.3	845.8
1868	0.0	60.6	422.1	5709.5	184.7	968.9
1869	0.0	41.0	282.1	5533.2	257.7	1018.5
1870	0.0	30.3	306.4	7252.2	326.5	1076.9
1871	18.1	21.1	983.0	6488.3	384.8	1254.3
1872	12.6	22.9	1016.3	7306.1	443.4	1497.6
1873	19.4	36.4	667.2	7095.0	429.8	1289.9
1874	5.7	42.1	364.0	6989.8	393.7	1849.1
1875	14.0	46.9	431.5	9046.1	427.4	1660.0
1876	13.9	16.3	475.4	7793.2	441.2	2011.4
1877	17.7	13.5	334.3	8554.6	566.3	2228.7
1878	16.3	30.4	350.2	5480.9	325.8	1433.0
1879	38.6	37.8	108.9	5136.9	447.0	1526.7
1880	101.7	29.8	89.6	6537.4	605.8	2465.8
1881	137.3	30.5	108.0	5935.6	625.4	3245.7
1882	323.7	32.2	103.3	5654.5	779.9	3713.9
1883	318.3	64.4	140.6	6299.4	562.6	4222.5
1884	364.7	57.3	247.9	6045.5	594.7	4016.5
1885	397.0	54.9	225.9	6261.7	415.6	6788.9
1886	720.5	30.4	90.4	7225.7	430.7	9226.5
1887	899.5	35.0	84.5	5153.1	432.2	5773.9
1888	891.1	32.7	229.0	5413.8	797.4	6735.3
1889	681.9	28.2	199.7	6035.5	640.7	5648.2
1890	974.6	31.4	106.2	6197.6	683.1	4016.7
1891	1136.9	41.1	112.6	6397.4	759.7	3965.1

obs	VX13	VX14	VX15	VX16	VX17	VX18
1892	1033.8	92.3	132.0	7714.6	633.6	4994.0
1893	928.9	116.8	205.1	5961.9	659.8	4624.0
1894	765.0	104.2	209.6	5416.4	653.5	3678.6
1895	1081.0	87.0	526.0	6344.0	733.0	4214.0
1896	1163.0	120.0	391.0	6205.0	675.0	4102.0
1897	1336.0	180.0	417.0	5860.0	787.0	3643.0
1898	1480.0	208.0	511.0	6456.0	788.0	4237.0
1899	1105.0	190.0	553.0	5700.0	780.0	4435.0
1900	1260.0	219.0	695.0	5739.0	798.0	4092.0
1901	1353.0	195.0	505.0	5511.0	750.0	3472.0
1902	1510.0	284.0	551.0	5684.0	773.0	3886.0
1903	1692.0	243.0	560.0	5334.0	793.0	4010.0
1904	1537.0	210.0	490.0	4630.0	752.0	4048.0
1905	1657.0	217.0	543.0	5027.0	829.0	4614.0
1906	2025.0	214.0	397.0	5559.0	740.0	4258.0
1907	1826.0	237.0	571.0	5266.0	517.0	4315.0
1908	1766.0	248.0	458.0	4945.0	489.0	3830.0
1909	1783.0	277.0	693.0	5040.0	491.0	3825.0
1910	1877.0	283.0	711.0	6704.0	583.0	5130.0
1911	2301.0	338.0	544.0	5678.0	602.0	5643.0
1912	2518.0	403.0	684.0	6260.0	606.0	5594.0
1913	2485.0	399.0	519.0	6279.0	645.0	5239.0
1914	1876.0	538.0	550.0	5403.0	471.0	3813.0

VALUE

obs	VX19	VX20	VX21	VX22	XOUT
1842	948.0	9.5	1.5	61.4	812.2
1843	1115.0	12.8	20.1	33.2	881.6
1844	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA
1848	574.0	4.2	0.0	64.0	981.1
1849	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA
1851	571.0	9.6	5.2	74.7	973.9
1852	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA
1855	802.0	18.9	24.3	73.4	2247.2
1856	738.0	32.3	19.9	98.0	1805.5
1857	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA
1861	573.0	63.5	29.4	85.2	1614.5
1862	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA
1865	413.0	64.9	26.3	71.8	1761.3
1866	460.0	90.0	39.1	74.9	1939.4
1867	371.0	88.6	36.1	72.3	1814.2
1868	347.0	93.0	50.0	61.0	1688.5
1869	370.0	115.0	53.6	89.7	2194.9
1870	423.0	141.7	59.1	96.9	2758.9
1871	372.0	188.9	65.4	126.4	2701.1
1872	418.0	198.3	53.7	102.4	2456.4
1873	393.0	180.7	198.0	104.6	2937.0
1874	385.0	180.5	234.3	106.2	2657.1
1875	519.0	242.4	338.1	126.1	2614.6
1876	381.0	168.4	184.7	101.9	2107.8
1877	337.0	132.2	214.5	127.5	2246.7
1878	223.0	148.2	148.9	115.3	2241.2
1879	239.0	155.1	202.3	121.2	2450.2
1880	287.0	212.9	403.2	123.2	2972.7
1881	180.0	293.8	333.6	101.7	2870.6
1882	164.0	174.9	395.2	79.9	2967.3
1883	111.0	157.0	405.0	104.4	3006.6
1884	133.0	192.5	559.3	95.0	2627.5
1885	131.0	178.9	487.7	71.0	2447.4
1886	118.0	115.2	451.7	63.6	2305.6
1887	159.0	88.9	492.0	62.0	2348.0
1888	194.0	88.2	666.6	70.5	2369.9
1889	202.0	77.2	810.4	77.1	2604.8
1890	187.0	48.3	720.7	72.5	2330.7
1891	203.0	43.1	649.1	86.3	2255.2

obs	VX19	VX20	VX21	VX22	XOUT
1892	380.0	44.4	665.0	79.8	3075.8
1893	659.0	57.5	738.0	107.4	3201.0
1894	782.0	70.6	755.1	118.9	4039.2
1895	1041.0	69.0	833.0	131.0	4644.9
1896	1245.0	61.0	757.0	121.0	5066.9
1897	1507.0	107.0	673.0	125.0	5800.7
1898	2597.0	131.0	686.0	183.0	6667.9
1899	2725.0	109.0	735.0	154.0	6524.8
1900	2374.0	154.0	862.0	179.0	8150.9
1901	1098.0	107.0	797.0	142.0	7636.9
1902	802.0	106.0	840.0	110.0	7433.0
1903	1672.0	105.0	890.0	114.0	8607.0
1904	1860.0	106.0	923.0	117.0	9179.9
1905	1530.0	106.0	948.0	115.0	7243.7
1906	1410.0	104.0	961.0	108.0	7781.9
1907	1382.0	112.0	989.0	136.0	8159.9
1908	981.0	97.0	976.0	123.0	8300.7
1909	1888.0	98.0	899.0	114.0	9155.9
1910	2708.0	13.0	974.0	130.0	9395.0
1911	1235.0	124.0	960.0	112.0	9439.9
1912	881.0	113.0	962.0	119.0	9070.6
1913	861.0	112.0	890.0	160.0	9523.0
1914	770.0	83.0	759.0	135.0	6637.0

Volume

obs	QX1	QX2	QX3	QX4	QX5B	QX6
1842	160	161	305	2037	0	445
1843	23	326	445	2820	0	520
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	143	197	449	3968	0	2004
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	147	312	893	4954	0	816
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	109	288	506	4772	0	4365
1856	110	640	641	6428	0	5881
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	111	688	787	7944	49793	11725
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	226	965	1330	9630	146663	6767
1866	200	1002	1545	9936	141649	7349
1867	344	796	795	11503	111873	8257
1868	616	988	761	11203	85690	13379
1869	513	1040	1231	12054	140947	23330
1870	479	432	947	10675	274363	30857
1871	387	1126	1668	12630	118884	27405
1872	270	1217	1091	15805	181689	18096
1873	145	977	1092	16556	222024	20018
1874	763	1088	652	18604	168053	14650
1875	318	795	725	12239	167805	24213
1876	1001	1579	752	16253	61773	14708
1877	856	1032	993	14428	183478	16732
1878	507	943	881	11343	175366	15719
1879	904	2042	736	10980	96976	15818
1880	456	1341	1212	17471	179023	17434
1881	520	236	609	18996	154600	14530
1882	805	239	767	22562	163950	24617
1883	387	216	800	19527	136783	23737
1884	392	190	582	21691	107528	19993
1885	437	187	686	21481	52416	10329
1886	498	193	720	21784	81394	6371
1887	598	160	826	22931	90211	6787
1888	882	152	925	21010	96984	10842
1889	1074	105	956	23658	79770	7616
1890	990	94	631	23053	114065	4832
1891	950	115	626	22302	120399	2104

obs	QX1	QX2	QX3	QX4	QX5B	QX6
1892	798	124	732	23424	131424	1735
1893	649	80	906	22655	192573	368
1894	740	279	871	22713	253373	10006
1895	1251	241	818	26929	195226	13246
1896	1034	135	968	28475	171351	17395
1897	1453	194	1109	32215	268319	23763
1898	1602	260	748	28605	288741	15943
1899	1451	167	671	24526	365680	9664
1900	1244	219	587	26920	404015	12824
1901	1184	228	860	29265	489869	13608
1902	858	164	863	27739	443649	11883
1903	895	181	1121	30761	397765	16637
1904	1392	321	1063	34900	463732	18556
1905	1502	133	1190	27465	380922	15195
1906	1658	193	1571	38434	377009	18211
1907	1467	148	767	40565	397038	10081
1908	1521	205	595	35029	401961	13547
1909	1759	167	1586	36258	306624	11444
1910	1371	147	1237	43132	324956	9505
1911	1055	227	842	42808	276698	13972
1912	1349	320	1227	45839	368703	10498
1913	1545	288	1092	48137	399617	17345
1914	1395	184	2303	40939	292958	5786

Volume

obs	QX7	QX8	QX9	QX10	QX11A	QX11B
1842	0	96	302	2414	120	180
1843	0	133	149	2675	101	589
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	6587	137	330	2738	48	526
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	4030	170	410	2923	157	402
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	1681	206	250	2234	717	1726
1856	3072	205	236	2327	350	848
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	2394	224	411	4700	2868	4360
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	1702	190	308	5750	1689	2664
1866	1832	615	545	5390	2147	2928
1867	3032	343	872	6860	1996	4481
1868	922	258	750	8689	2103	2831
1869	2616	287	691	7896	1781	4236
1870	5466	357	485	6986	1752	3141
1871	2361	323	623	8689	1868	6019
1872	3656	368	697	13639	1373	5559
1873	6950	237	780	12268	2969	5258
1874	4491	320	855	6952	9615	7585
1875	4699	297	602	3135	1621	7590
1876	4140	552	541	7942	911	6870
1877	0	240	3450	4815	2734	5844
1878	2297	447	842	3584	6728	5839
1879	2861	188	0	7114	1946	7175
1880	3848	147	887	7365	2988	8193
1881	2784	158	343	8399	3165	2611
1882	3143	155	769	5495	2651	5727
1883	6024	101	528	9088	1747	4760
1884	8588	98	646	5394	1320	4156
1885	3582	92	544	6695	1488	4465
1886	5979	72	1065	8353	1813	5459
1887	7257	49	735	13264	1763	6561
1888	7838	51	892	9701	2126	8246
1889	6542	68	1435	9169	3867	9533
1890	6555	45	1198	9558	2125	8132
1891	7481	36	772	6348	1629	9517

obs	QX7	QX8	QX9	QX10	QX11A	QX11B
1892	8021	43	503	8746	2955	8583
1893	5796	43	1079	5861	3511	8572
1894	6170	47	1273	7825	3417	10172
1895	5651	37	394	8179	3772	10088
1896	2838	47	1750	7074	4840	11535
1897	5825	37	1222	6396	4557	15556
1898	5667	48	2267	10439	5407	20005
1899	2988	32	1121	6047	2813	16494
1900	2341	41	1111	7171	4988	16066
1901	3408	27	704	9043	6696	16756
1902	5625	20	862	9155	5093	16391
1903	3472	17	2123	5426	6048	20070
1904	4207	5	1022	6064	7160	15207
1905	5556	11	2522	4214	5611	14236
1906	6383	6	1249	6041	6391	14995
1907	6471	4	2671	2650	5741	12042
1908	5899	6	1424	2731	3988	13423
1909	8481	4	1841	4771	4824	14987
1910	11559	1	2555	7082	6260	15991
1911	14870	2	2676	7212	7010	14037
1912	14391	1	1320	5339	7535	11669
1913	11750	2	2282	4909	4765	15137
1914	6916	2	977	5818	4098	18300

VOLUME

obs	QX11C	QX12	QX13	QX14	QX15	QX16
1842	1667	68	0	2	984	11402
1843	1573	132	0	1	732	11105
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	2597	182	0	0	1459	14976
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	2867	130	0	43	1119	11149
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	3820	268	0	1981	1320	14129
1856	3577	107	0	419	8888	17192
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	8118	190	0	765	3450	17981
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	8026	145	31	216	3262	21529
1866	7371	142	14	318	5350	21518
1867	8488	177	31	357	6795	18093
1868	7202	183	0	640	1948	19018
1869	10235	167	0	392	2523	21965
1870	12094	192	0	271	1678	23982
1871	16438	168	113	238	5896	22733
1872	8197	184	68	245	5822	27078
1873	10296	258	105	369	4259	27362
1874	11341	423	41	741	2422	28649
1875	12042	258	70	577	4317	32427
1876	8031	246	68	154	3779	31469
1877	30785	192	64	135	1247	32899
1878	9228	103	65	323	2043	26207
1879	12520	168	182	390	729	26048
1880	13901	192	372	373	480	33428
1881	11928	126	533	339	620	29719
1882	15980	114	1551	286	586	31762
1883	13875	188	1602	664	986	35194
1884	13152	116	2949	586	1489	33254
1885	15348	81	3555	555	1511	14787
1886	14807	118	6444	331	671	40143
1887	17662	183	8614	408	686	28132
1888	19055	173	7733	394	1571	26802
1889	16328	190	5681	276	1267	29987
1890	16893	111	8125	316	589	30530
1891	18105	145	10087	419	544	30997

obs	QX11C	QX12	QX13	QX14	QX15	QX16
1892	20918	153	10272	908	632	36293
1893	20415	167	9232	1166	1089	25929
1894	16674	151	6350	1168	1144	24109
1895	20535	126	10728	879	2744	27251
1896	16167	90	11546	1272	2145	28456
1897	18009	130	11755	1732	2163	28099
1898	20145	143	13224	1973	2592	31328
1899	15068	136	9546	1732	2231	27917
1900	13217	149	10809	2408	3795	27531
1901	13930	163	11872	2138	2836	26840
1902	21764	149	14639	3082	2902	27472
1903	15118	112	17088	2820	3258	25636
1904	12364	101	15683	2537	2708	21586
1905	11173	82	17009	2615	3065	23521
1906	9181	107	21417	2628	1899	26362
1907	8904	118	19374	2994	2673	24511
1908	7857	124	18738	3431	2019	23051
1909	9494	120	19089	3758	3397	23457
1910	9636	119	20218	4174	3590	31136
1911	9060	97	24921	4284	2101	25625
1912	9782	42	27451	4922	3044	28310
1913	9077	40	26795	4192	2133	28890
1914	16165	47	20264	5575	2108	26408

Volume

obs	QX17	QX18	QX19A	QX19B	QX19C	QX19D
1842	79	6444	26	1	646	94
1843	3080	9189	93	1	856	144
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	1525	15974	8	1	530	40
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	3322	15393	10	1	512	43
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	840	9673	16	8	627	57
1856	721	7894	13	3	680	38
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	402	6044	25	2	479	40
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	203	14773	27	3	197	25
1866	289	7886	43	3	212	58
1867	310	7001	37	2	247	50
1868	375	7969	30	1	202	18
1869	385	10185	22	3	221	43
1870	433	9636	30	4	657	54
1871	589	11415	62	4	233	23
1872	645	15242	28	4	286	20
1873	741	12099	65	3	264	16
1874	693	23808	159	5	242	30
1875	840	17489	37	1	712	125
1876	876	20506	26	2	583	52
1877	1529	22684	18	0	173	265
1878	618	15664	39	4	153	9
1879	1019	14884	27	10	182	71
1880	1348	24551	38	5	175	195
1881	1293	39142	42	5	80	10
1882	1538	44181	38	3	99	12
1883	1286	50530	36	1	65	3
1884	1612	47158	23	2	115	3
1885	2309	112981	29	3	81	5
1886	2393	153776	28	2	48	8
1887	2112	116491	35	2	97	5
1888	2414	143872	53	2	114	7
1889	1908	115535	83	2	115	9
1890	2040	58814	57	2	137	6
1891	2384	49197	90	2	136	10

obs	QX17	QX18	QX19A	QX19B	QX19C	QX19D
1892	1929	61953	121	1	346	10
1893	1962	49065	123	1	693	16
1894	2007	35027	130	2	965	15
1895	2283	38711	97	2	1404	31
1896	2254	45395	144	5	1600	22
1897	2417	47710	120	2	1877	29
1898	2430	52651	181	2	3915	21
1899	2511	52610	171	2	3928	18
1900	2620	52714	119	2	3046	11
1901	2393	49838	64	2	1323	4
1902	2554	53923	35	1	883	5
1903	2640	49686	43	1	2462	4
1904	2498	48850	53	1	3116	4
1905	2749	63757	37	1	2412	2
1906	2516	61972	29	1	2194	1
1907	2425	64120	67	1	1831	3
1908	2324	57414	87	1	1278	2
1909	2385	60461	77	1	2865	1
1910	2826	81592	66	1	4165	3
1911	2966	87899	30	1	1719	2
1912	2852	83530	32	0	1237	2
1913	3429	75625	18	1	1244	2
1914	3255	56183	17	0	1090	0

Volume

obs	QX20	QX21	QX22	QX104	QX105	QX106
1842	17929	15	337	4211	55	11
1843	18286	297	178	2190	58	14
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	6000	0	704	1280	43	6
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	13714	58	695	1840	157	22
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	20347	249	406	48009	75	44
1856	44129	195	557	54819	82	20
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	105031	380	672	82610	233	30
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	68600	272	472	111585	277	42
1866	122513	402	652	92704	254	34
1867	134843	355	509	90822	126	37
1868	139626	451	959	44880	256	27
1869	101404	469	633	65590	320	29
1870	282362	524	667	84081	368	53
1871	314133	481	936	90699	357	51
1872	387598	459	687	84835	335	61
1873	314155	839	1150	71781	260	63
1874	405881	2320	861	75183	860	45
1875	433907	2552	1325	59733	183	56
1876	235600	1159	1007	47998	404	51
1877	207213	986	1172	72355	230	90
1878	221119	649	1622	205999	155	50
1879	208501	920	1066	245506	170	55
1880	635540	1154	825	272876	352	65
1881	576154	1140	1591	268981	336	123
1882	547702	2038	618	206810	266	83
1883	449696	1329	785	70443	332	59
1884	517687	1664	752	68711	218	74
1885	554952	1337	688	91662	195	89
1886	319735	1263	648	56795	185	48
1887	217653	1413	772	72962	232	51
1888	205194	2026	863	110722	214	54
1889	189693	2516	893	112908	240	59
1890	109052	2156	893	75829	144	54
1891	76166	2162	1030	53819	195	74

obs	QX20	QX21	QX22	QX104	QX105	QX106
1892	76949	2183	922	49452	190	69
1893	111062	2316	1562	71684	229	79
1894	142443	2548	1555	82596	588	78
1895	139090	2939	1543	99662	307	110
1896	91925	2798	1488	82830	255	103
1897	118624	2804	1394	139567	352	102
1898	121379	3030	2556	210262	325	76
1899	100708	2977	1496	158142	302	115
1900	126924	3457	1490	163722	358	103
1901	84701	3410	1131	69854	350	84
1902	93235	3360	1043	49376	271	78
1903	96143	3745	1219	44989	180	67
1904	108769	3577	1215	39145	169	80
1905	104550	3603	1077	32807	263	125
1906	104463	3828	1136	28868	290	96
1907	139210	4218	1343	40576	245	114
1908	102570	4059	1156	30429	173	147
1909	118750	4006	1179	49404	192	167
1910	135705	4016	1389	79091	210	197
1911	114524	3843	1216	39767	232	175
1912	118030	4178	1266	38517	148	178
1913	101248	3960	1739	43863	173	248
1914	90569	3442	1310	24597	128	171

volumé

obs	QX107	QX108
1842	27	0
1843	11	0
1844	NA	NA
1845	NA	NA
1846	NA	NA
1847	NA	NA
1848	9	0
1849	NA	NA
1850	NA	NA
1851	14	0
1852	NA	NA
1853	NA	NA
1854	NA	NA
1855	99	0
1856	109	0
1857	NA	NA
1858	NA	NA
1859	NA	NA
1860	NA	NA
1861	135	23
1862	NA	NA
1863	NA	NA
1864	NA	NA
1865	155	676
1866	230	170
1867	151	31
1868	185	253
1869	228	49
1870	214	72
1871	195	94
1872	198	108
1873	158	154
1874	140	3
1875	112	8
1876	127	1
1877	59	0
1878	81	51
1879	114	120
1880	170	149
1881	113	195
1882	161	90
1883	98	0
1884	86	0
1885	113	48
1886	137	73
1887	143	31
1888	166	69
1889	167	61
1890	133	61
1891	164	41

obs	QX107	QX108
1892	185	69
1893	163	86
1894	170	65
1895	186	90
1896	169	35
1897	158	69
1898	148	70
1899	159	101
1900	264	202
1901	242	83
1902	146	87
1903	209	69
1904	216	53
1905	223	59
1906	203	70
1907	180	75
1908	136	73
1909	143	138
1910	212	52
1911	140	82
1912	186	96
1913	133	86
1914	194	54

C.4

IMPORT SERIES

1	Live animals	
1a	Cattle	(units)
2	Butter	
3	Cod-fish	
4	Cereals	
4a	Wheat	
5	Rice	
6	Sugar	
7	Coffee and tea	
7a	Coffee	
7b	Tea	
8	Tobacco, raw and manufactured	
8a	Raw tobacco	
9	Raw cotton	
10	Raw wool	
11	Raw silk	
12	Raw flax and hemp	
13	Raw hides and skins	
14	Oil-seeds	
15	Chemical fertilizers	
16	Dye-stuffs	
17	Sulphur	
18	Coal and coke	
19	Cotton thread	
20	Flax, hemp and jute thread	
21	Leather	
22	Cement	
23	Chemical products	
24	Timber	
24a	Wood	
25	Wrought and cast iron	
26	Wrought and cast steel	
27	Copper and brass plates	
28	Tin plates	
29	Cottons	
30	Woollens	
31	Silks	
32	Kerosene	
33	Paper	
34	Steel, iron and copper, manufactured	
35	Tools and machinery for industry	
36	Railway equipment	
37	Other	

obs	VM1	VM2	VM3	VM4	VM5	VM6
1842	80.3	393.7	823.4	32.6	49.7	478.8
1843	101.3	420.2	955.5	41.9	462.5	727.0
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	60.0	316.7	694.0	198.8	250.2	721.9
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	90.2	401.8	891.5	188.2	194.1	978.7
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	325.8	396.1	874.3	600.0	153.3	1265.0
1856	386.7	467.5	1009.9	2529.1	553.6	1645.9
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	1347.1	533.7	1046.0	182.9	403.8	2126.3
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	798.8	483.5	1302.6	1972.1	474.6	2092.2
1866	964.5	490.4	1447.7	1664.4	281.6	2150.9
1867	758.6	545.0	1306.2	3131.9	290.4	1991.6
1868	462.2	475.0	1201.5	3727.7	442.9	1737.3
1869	636.3	468.6	1190.2	2220.9	491.2	1844.0
1870	918.4	478.7	1142.4	2955.1	422.4	2362.7
1871	1033.6	468.4	1380.4	1901.2	474.2	1737.6
1872	1441.1	559.4	1653.2	1641.4	474.5	2069.6
1873	825.2	503.0	1461.3	1551.5	399.7	1946.3
1874	971.5	540.1	1277.1	1660.9	323.4	2072.4
1875	895.6	558.0	1373.5	4455.6	701.3	1942.4
1876	981.8	528.1	1355.3	5848.3	656.3	1744.0
1877	1635.9	623.0	1408.7	2968.8	600.7	2296.2
1878	1143.8	611.9	1306.3	4612.9	415.8	1999.3
1879	858.0	644.7	1271.9	7023.7	537.7	1837.6
1880	670.0	912.0	1395.2	4916.0	580.2	2076.6
1881	914.5	591.5	1395.2	5433.1	559.7	2006.2
1882	1027.8	516.0	1455.9	6551.8	634.5	2000.7
1883	998.1	560.6	1361.1	4627.0	662.7	1910.9
1884	938.0	502.2	1576.5	5024.5	711.4	1789.2
1885	1037.1	501.8	1720.3	4170.0	618.3	1639.6
1886	1322.2	510.7	1796.6	4734.2	607.5	1721.9
1887	873.9	555.4	1625.1	4911.0	675.3	1651.2
1888	1207.1	464.0	1682.3	4133.9	699.7	1672.8
1889	1725.7	476.0	1978.6	3290.4	711.1	1839.3
1890	1418.2	476.1	1747.5	3967.3	808.9	1981.8
1891	1071.9	428.0	1607.5	4988.5	732.8	1803.6

obs	VM1	VM2	VM3	VM4	VM5	VM6
1892	430.7	275.6	1657.3	4691.6	624.9	1829.0
1893	1083.9	267.4	1833.8	5746.8	659.1	1869.9
1894	1262.7	248.5	1906.3	4178.2	600.6	2029.5
1895	2034.2	244.9	1960.0	5540.8	804.4	1953.9
1896	2487.3	187.4	2270.1	4236.8	791.4	1917.5
1897	2664.0	142.0	2208.0	5989.0	666.0	1908.0
1898	3142.0	86.0	1918.0	4781.0	805.0	2092.0
1899	1844.0	65.0	1932.0	6465.0	1082.0	2110.0
1900	2831.0	39.0	2821.0	3797.0	1136.0	2244.0
1901	3348.0	37.0	3449.0	3496.0	1201.0	2308.0
1902	4211.0	33.0	3459.0	951.0	1276.0	2229.0
1903	3333.0	38.0	3525.0	3390.0	1200.0	2325.0
1904	3490.0	32.0	3262.0	4558.0	1624.0	2572.0
1905	3138.0	33.0	3055.0	7214.0	1562.0	2381.0
1906	2607.0	32.0	3636.0	4529.0	1491.0	2420.0
1907	2391.0	32.0	3753.0	1461.0	1601.0	2499.0
1908	3416.0	13.0	3916.0	7945.0	1878.0	2516.0
1909	2859.0	11.0	4040.0	7161.0	1657.0	2650.0
1910	3456.0	12.0	4127.0	4408.0	1699.0	2537.0
1911	3031.0	12.0	3873.0	906.0	1773.0	2876.0
1912	2516.0	5.0	5336.0	5041.0	1719.0	2673.0
1913	1976.0	4.0	4388.0	11392.0	2019.0	3045.0
1914	305.0	2.0	3870.0	8984.0	1771.0	3118.0

Values

obs	VM7	VM8	VM9	VM10	VM11	VM12
1842	286.0	73.9	69.5	1.3	81.7	446.8
1843	304.0	133.9	59.0	23.4	165.3	714.0
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	166.0	118.7	118.5	55.3	155.4	579.4
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	466.0	108.2	218.4	67.8	158.7	473.0
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	499.0	132.3	369.6	104.0	287.5	512.6
1856	569.0	144.0	354.4	129.6	156.8	355.1
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	566.0	331.5	508.7	220.7	296.4	524.4
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	761.0	1041.3	566.3	284.3	250.6	540.9
1866	763.0	565.4	764.4	348.8	307.0	363.8
1867	753.0	539.0	554.9	305.0	268.6	886.9
1868	736.0	624.6	485.3	286.5	277.7	368.2
1869	641.0	469.4	595.4	393.4	268.2	606.7
1870	935.0	578.9	564.6	405.7	214.7	737.7
1871	412.0	493.1	528.1	395.1	340.2	650.7
1872	641.0	478.0	568.5	517.4	224.7	393.7
1873	807.0	861.4	537.8	656.7	288.9	613.9
1874	834.0	473.3	491.5	670.7	183.1	467.9
1875	785.0	552.2	573.9	836.2	182.8	591.5
1876	760.0	600.6	511.6	601.3	125.8	464.4
1877	775.0	820.5	594.8	613.6	160.3	478.6
1878	827.0	730.8	586.3	768.0	125.4	514.6
1879	785.0	885.4	724.9	581.8	116.2	477.0
1880	715.0	287.2	862.5	609.7	137.9	375.5
1881	751.0	450.2	833.1	777.9	111.8	223.4
1882	718.0	489.0	806.1	621.0	98.4	265.4
1883	496.0	523.8	907.2	686.2	100.0	233.7
1884	521.0	632.9	825.4	757.8	94.7	319.2
1885	657.0	579.3	891.4	745.5	102.6	299.0
1886	690.0	748.9	1045.6	1352.0	87.8	350.2
1887	732.0	807.9	1012.3	905.3	96.3	361.2
1888	824.0	760.7	1118.8	923.5	138.6	363.9
1889	758.0	711.7	1180.0	954.0	108.7	472.0
1890	759.0	533.4	1891.7	1215.1	107.2	341.3
1891	823.0	366.0	1591.3	836.7	84.2	276.5

obs	VM7	VM8	VM9	VM10	VM11	VM12
1892	783.0	359.2	1646.3	858.3	74.1	228.8
1893	857.0	443.1	2583.7	1676.4	140.4	274.6
1894	884.0	505.8	2399.7	1157.7	133.6	348.6
1895	890.0	751.4	2590.3	1149.5	115.7	259.3
1896	952.0	617.5	2103.7	1091.3	118.7	353.0
1897	945.0	516.0	2840.0	1174.0	113.0	317.0
1898	947.0	581.0	3532.0	1150.0	162.0	379.0
1899	839.0	721.0	3486.0	1536.0	174.0	320.0
1900	851.0	705.0	4476.0	1542.0	245.0	394.0
1901	910.0	615.0	3855.0	1478.0	177.0	420.0
1902	934.0	610.0	3956.0	1565.0	175.0	376.0
1903	992.0	737.0	3905.0	1667.0	187.0	431.0
1904	966.0	919.0	4817.0	1334.0	180.0	321.0
1905	961.0	730.0	3670.0	1001.0	176.0	270.0
1906	1007.0	576.0	3123.0	964.0	184.0	252.0
1907	981.0	759.0	4529.0	1111.0	203.0	306.0
1908	945.0	838.0	4357.0	1027.0	227.0	337.0
1909	961.0	1043.0	4194.0	1176.0	195.0	333.0
1910	954.0	877.0	5658.0	1442.0	207.0	314.0
1911	930.0	946.0	6105.0	1427.0	192.0	365.0
1912	849.0	980.0	5234.0	1617.0	257.0	372.0
1913	1103.0	1018.0	5676.0	1672.0	240.0	366.0
1914	913.0	1100.0	4916.0	1200.0	281.0	236.0

VALUES

obs	VM13	VM14	VM15	VM16	VM17	VM18
1842	423.9	0.0	0.0	89.4	13.4	98.1
1843	413.4	0.0	0.0	108.0	8.7	137.3
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	217.5	0.0	0.0	114.1	1.7	162.1
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	195.0	0.0	0.0	144.9	21.5	287.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	400.0	53.4	0.0	221.9	8.2	289.2
1856	404.4	114.4	0.0	204.1	9.9	441.4
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	650.6	86.6	0.0	196.7	185.3	453.9
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	411.3	60.1	0.0	169.9	56.1	466.4
1866	455.3	131.7	0.0	187.5	140.4	659.3
1867	372.4	124.0	0.0	200.3	253.8	705.4
1868	354.9	125.5	0.0	167.1	230.3	970.2
1869	299.7	81.3	0.0	168.2	77.3	642.1
1870	477.7	123.5	0.0	194.8	127.6	954.9
1871	496.4	70.7	0.0	207.3	119.2	854.9
1872	759.9	90.6	0.0	222.4	160.5	957.3
1873	1113.6	23.5	0.0	267.9	142.2	1509.7
1874	906.3	31.1	0.0	266.3	96.4	987.0
1875	683.0	31.4	0.0	301.0	225.0	2448.2
1876	525.8	61.9	0.0	236.1	104.3	1204.9
1877	793.3	69.6	0.0	325.6	130.8	1508.9
1878	688.4	80.8	0.0	290.5	97.1	1073.2
1879	501.5	107.6	0.0	276.3	206.5	1198.4
1880	615.9	38.4	0.0	267.5	331.4	1484.7
1881	713.5	92.4	0.0	299.0	287.6	1198.0
1882	653.8	114.4	0.0	367.5	444.8	1426.1
1883	570.7	109.5	0.0	274.8	498.6	1510.3
1884	616.8	121.1	0.0	339.3	291.7	1631.2
1885	589.1	98.6	10.2	338.4	376.7	1419.6
1886	709.6	157.0	71.3	369.7	576.7	1530.7
1887	700.0	107.3	16.6	372.7	328.3	1507.0
1888	788.3	188.1	49.1	401.7	260.0	1533.4
1889	744.1	132.6	40.0	461.7	304.2	1872.6
1890	671.0	212.5	55.1	442.5	327.8	2023.6
1891	536.0	269.4	69.3	415.6	265.2	2130.5

obs	VM13	VM14	VM15	VM16	VM17	VM18
1892	780.8	253.4	49.8	306.7	336.0	1838.5
1893	844.2	349.2	49.5	409.7	198.3	1658.7
1894	834.7	363.5	54.0	316.5	190.8	1961.2
1895	776.0	455.0	88.5	354.2	267.0	1771.2
1896	908.8	559.2	82.0	406.2	224.7	1742.9
1897	754.0	393.0	121.0	406.0	184.0	1808.0
1898	822.0	1021.0	340.0	550.0	247.0	2873.0
1899	744.0	764.0	455.0	499.0	422.0	3214.0
1900	1240.0	965.0	465.0	583.0	339.0	5492.0
1901	1397.0	724.0	737.0	534.0	394.0	5096.0
1902	1547.0	1174.0	912.0	562.0	273.0	4614.0
1903	1317.0	1139.0	932.0	660.0	362.0	4060.0
1904	1152.0	1024.0	847.0	614.0	226.0	3830.0
1905	864.0	1118.0	862.0	523.0	279.0	3416.0
1906	1145.0	1089.0	1225.0	532.0	299.0	3596.0
1907	1123.0	1322.0	1367.0	510.0	205.0	4267.0
1908	1119.0	1152.0	1433.0	510.0	266.0	4224.0
1909	1019.0	1098.0	1192.0	562.0	358.0	4048.0
1910	1416.0	1436.0	1555.0	621.0	257.0	4152.0
1911	1584.0	1904.0	1556.0	603.0	373.0	3920.0
1912	1505.0	1415.0	1452.0	642.0	335.0	5125.0
1913	1415.0	1602.0	1313.0	696.0	337.0	5602.0
1914	981.0	1297.0	1149.0	444.0	211.0	4964.0

VALUES

obs	VM19	VM20	VM21	VM22	VM23	VM24
1842	177.1	0.0	47.8	1.2	61.3	251.7
1843	289.6	0.0	51.2	1.1	126.8	391.9
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	270.7	0.0	36.4	1.4	53.8	420.6
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	204.2	0.0	40.1	1.6	167.6	539.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	223.2	0.0	38.6	6.6	107.0	358.6
1856	276.9	0.0	51.5	3.2	139.3	429.1
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	175.5	2.5	79.7	32.4	150.5	562.6
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	164.1	50.5	142.1	8.7	167.8	621.5
1866	231.5	48.9	157.5	13.2	168.9	473.5
1867	194.6	40.3	158.0	13.9	194.2	493.4
1868	180.7	41.0	132.0	9.2	163.2	446.4
1869	192.9	35.6	120.5	11.6	174.8	387.9
1870	166.2	48.8	83.0	7.6	170.4	586.2
1871	202.4	69.8	126.6	12.1	269.9	530.6
1872	203.4	52.4	130.7	12.4	270.9	590.9
1873	330.7	77.9	182.9	12.9	263.3	839.0
1874	335.8	96.1	98.8	26.0	227.5	1123.8
1875	357.9	103.3	191.4	23.8	271.8	778.6
1876	254.0	84.1	191.5	23.7	255.2	784.1
1877	216.3	99.7	216.4	27.0	276.7	842.3
1878	81.2	82.8	170.2	31.7	249.4	652.6
1879	182.7	73.4	202.2	40.3	261.5	658.1
1880	198.7	112.7	207.6	35.0	293.0	872.9
1881	209.8	143.6	149.3	52.9	265.1	794.3
1882	209.0	127.5	172.7	49.1	283.2	895.3
1883	241.7	111.8	183.3	63.3	196.0	826.0
1884	253.7	128.2	188.1	79.0	218.7	713.5
1885	275.9	150.4	237.0	91.3	320.8	998.9
1886	272.2	160.1	288.9	187.9	322.3	1042.7
1887	284.9	193.8	297.4	242.1	334.2	1098.9
1888	361.6	215.1	305.0	176.9	296.6	1318.3
1889	272.8	235.7	324.9	187.5	299.9	1590.7
1890	329.7	234.5	344.0	241.1	372.7	1148.2
1891	399.0	176.9	332.8	159.4	311.7	1028.6

obs	VM19	VM20	VM21	VM22	VM23	VM24
1892	192.5	205.0	181.5	108.4	355.4	1071.9
1893	275.3	277.2	250.9	129.0	504.6	1538.5
1894	263.2	277.1	210.6	114.6	576.4	1060.5
1895	341.1	270.9	255.5	88.5	599.7	1140.0
1896	362.5	269.9	298.4	97.6	654.0	1022.1
1897	370.0	285.0	310.0	99.2	512.0	1133.0
1898	452.0	344.0	338.0	98.9	769.0	1600.0
1899	488.0	398.0	378.0	124.2	784.0	1504.0
1900	408.0	463.0	478.0	150.4	1001.0	1717.0
1901	445.0	432.0	500.0	155.0	930.0	1421.0
1902	423.0	431.0	544.0	159.0	916.0	1436.0
1903	450.0	440.0	544.0	159.0	1223.0	1694.0
1904	440.0	426.0	582.0	152.0	1528.0	1722.0
1905	456.0	380.0	603.0	155.0	1151.0	1616.0
1906	448.0	411.0	628.0	173.0	1227.0	2056.0
1907	435.0	427.0	629.0	173.0	1360.0	1742.0
1908	401.0	366.0	648.0	154.0	1337.0	1616.0
1909	226.0	448.0	747.0	154.0	1436.0	1751.0
1910	287.0	499.0	858.0	187.0	1192.0	1704.0
1911	272.0	513.0	983.0	203.0	1457.0	1776.0
1912	276.0	749.0	976.0	243.0	1473.0	2000.0
1913	224.0	822.0	1019.0	307.0	1592.0	2099.0
1914	186.0	691.0	855.0	216.0	1803.0	1542.0

VALUE

obs	VM25	VM26	VM27	VM28	VM29	VM30
1842	370.0	38.2	50.2	37.3	2419.7	678.2
1843	312.5	44.6	48.6	31.8	3321.4	1054.5
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	512.2	45.7	51.3	32.9	2878.2	799.0
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	462.1	53.3	80.7	53.4	2769.9	862.6
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	706.3	50.4	134.8	67.4	3308.0	985.3
1856	643.4	37.2	132.2	66.4	2821.9	1089.2
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	1136.2	65.2	81.1	70.2	3576.1	1290.3
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	542.9	74.1	84.8	55.7	3822.0	1610.9
1866	585.0	53.5	56.9	53.9	4625.2	1560.8
1867	743.4	51.5	82.4	96.8	4283.9	1432.9
1868	507.1	52.4	76.3	64.7	3782.3	1224.6
1869	589.0	49.9	74.9	71.6	3383.7	1247.2
1870	644.1	65.1	65.3	76.1	3968.5	1200.1
1871	698.3	54.5	91.3	102.0	3820.5	1532.2
1872	960.7	53.0	95.8	111.5	4247.3	2316.9
1873	1207.8	70.3	165.8	147.4	4698.0	1768.2
1874	1399.0	128.9	171.3	148.0	3598.3	1678.1
1875	1281.4	111.8	136.4	138.8	3953.0	2165.7
1876	852.6	63.3	104.2	109.7	3435.6	1840.9
1877	762.0	58.8	99.1	110.5	3333.0	1687.1
1878	799.5	70.9	107.7	99.7	2974.4	1337.2
1879	479.1	57.8	118.3	102.4	2657.2	1257.5
1880	724.4	50.2	92.4	133.4	3881.5	1479.4
1881	756.8	50.5	112.9	142.4	3276.3	1410.5
1882	840.3	64.8	77.2	107.9	2741.3	1482.0
1883	881.6	57.3	62.7	148.8	2748.6	1527.9
1884	930.8	56.3	97.5	185.5	2715.1	1581.2
1885	898.8	75.0	120.9	180.2	2820.4	1444.6
1886	824.8	50.4	72.3	224.3	2977.0	1514.0
1887	897.1	52.8	81.7	379.5	2945.6	1493.4
1888	993.6	66.3	92.6	275.9	3022.1	1622.6
1889	1131.2	85.4	100.0	311.0	3281.8	1752.7
1890	1163.8	73.8	91.7	331.2	3021.4	1670.4
1891	989.4	46.1	99.4	441.6	2557.4	1398.9

obs	VM25	VM26	VM27	VM28	VM29	VM30
1892	912.3	53.7	152.3	355.6	1152.7	542.6
1893	1176.7	70.8	94.8	392.7	1931.9	922.6
1894	1001.5	80.0	90.6	210.4	1751.3	871.0
1895	961.5	94.0	106.0	377.0	2041.0	1048.7
1896	1115.5	115.3	124.1	360.0	2084.2	882.8
1897	1006.0	89.0	94.0	352.0	2034.0	726.0
1898	1336.0	165.0	125.0	539.0	2347.0	820.0
1899	1659.0	164.0	169.0	409.0	2575.0	867.0
1900	2078.0	229.0	238.0	706.0	2556.0	1045.0
1901	1686.0	221.0	238.0	708.0	2574.0	1100.0
1902	1603.0	153.0	187.0	908.0	2546.0	1020.0
1903	1720.0	322.0	214.0	782.0	2810.0	1117.0
1904	1792.0	156.0	233.0	845.0	2715.0	1042.0
1905	1539.0	241.0	196.0	725.0	2682.0	1002.0
1906	1613.0	165.0	225.0	754.0	2927.0	962.0
1907	1662.0	194.0	227.0	849.0	2930.0	1006.0
1908	1766.0	200.0	342.0	931.0	2609.0	999.0
1909	1675.0	206.0	256.0	964.0	2738.0	925.0
1910	2104.0	287.0	237.0	1072.0	3517.0	934.0
1911	1910.0	308.0	199.0	1555.0	3579.0	788.0
1912	2337.0	186.0	202.0	1637.0	3539.0	706.0
1913	2648.0	308.0	241.0	1721.0	3445.0	718.0
1914	1588.0	357.0	243.0	1168.0	2780.0	526.0

VALUES

obs	VM31	VM32	VM33	VM34	VM35	VM36
1842	70.2	0.0	24.8	197.7	40.0	0.0
1843	65.3	0.0	29.7	302.5	35.6	0.0
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	56.0	0.0	10.3	123.0	90.1	0.0
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	92.7	0.0	10.2	222.4	96.2	0.0
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	363.4	0.0	13.5	318.0	156.0	0.0
1856	439.2	0.0	17.8	189.6	159.0	0.0
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	509.1	0.4	16.7	371.5	231.4	0.0
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	456.7	73.8	87.0	179.1	215.3	334.2
1866	452.8	124.2	86.3	154.5	194.8	287.9
1867	467.4	139.0	79.7	180.1	159.3	20.6
1868	415.8	208.6	81.6	156.5	121.6	50.8
1869	433.3	373.4	69.2	252.2	156.7	45.7
1870	410.9	426.6	58.8	146.9	194.9	41.8
1871	499.8	285.5	55.1	172.5	186.2	41.8
1872	517.9	307.9	79.4	210.1	281.6	542.6
1873	766.7	324.7	125.4	223.4	485.1	428.2
1874	636.5	243.7	105.8	343.2	456.8	254.5
1875	835.5	148.1	118.7	560.7	676.7	774.2
1876	785.8	182.0	138.9	422.2	904.9	433.4
1877	774.2	248.4	190.4	356.0	425.6	284.4
1878	655.6	260.6	326.0	281.1	537.0	326.2
1879	625.7	294.8	195.0	267.7	445.9	890.7
1880	589.3	222.0	175.3	275.4	421.9	863.3
1881	614.2	309.3	148.2	314.4	528.1	947.0
1882	674.8	250.4	189.4	305.7	332.9	683.8
1883	774.8	154.0	182.1	317.6	480.0	343.0
1884	714.7	290.5	163.2	499.3	619.3	305.0
1885	982.1	247.7	185.2	524.1	567.7	409.5
1886	963.8	247.0	243.7	403.8	568.5	926.2
1887	961.7	240.5	227.8	465.8	691.5	1122.7
1888	974.5	324.1	246.2	460.8	839.8	1032.1
1889	1200.3	366.6	248.7	722.2	1038.4	1126.9
1890	1028.4	442.2	279.6	645.0	1294.3	1784.0
1891	786.2	524.1	288.9	496.2	867.7	1350.7

obs	VM31	VM32	VM33	VM34	VM35	VM36
1892	409.3	530.1	168.7	361.1	772.4	291.7
1893	679.5	529.4	252.3	414.6	701.8	29.1
1894	618.0	532.5	149.3	330.5	804.5	34.7
1895	722.0	468.8	131.5	373.1	749.4	70.6
1896	736.3	514.8	156.0	409.7	756.4	112.0
1897	686.0	532.0	176.0	452.0	991.0	223.0
1898	741.0	542.0	196.0	569.0	1517.0	285.0
1899	805.0	572.0	212.0	560.0	1173.0	362.0
1900	818.0	568.0	185.0	712.0	1805.0	390.0
1901	767.0	660.0	233.0	884.0	2004.0	607.0
1902	760.0	562.0	205.0	898.0	1389.0	786.0
1903	841.0	565.0	203.0	827.0	1805.0	716.0
1904	897.0	465.0	199.0	897.0	1897.0	1103.0
1905	970.0	475.0	185.0	994.0	1693.0	691.0
1906	971.0	503.0	157.0	987.0	1875.0	757.0
1907	1082.0	530.0	181.0	1009.0	2341.0	658.0
1908	919.0	510.0	183.0	1004.0	2278.0	1363.0
1909	943.0	510.0	196.0	854.0	2224.0	438.0
1910	1098.0	521.0	202.0	1028.0	2224.0	598.0
1911	980.0	507.0	216.0	1059.0	2243.0	936.0
1912	1050.0	594.0	218.0	1376.0	2661.0	812.0
1913	1164.0	498.0	230.0	1347.0	3524.0	1269.0
1914	1022.0	482.0	187.0	1022.0	2714.0	1116.0

Volcmos

obs	QM1A	QM2	QM3	QM4A	QM5	QM6
1842	3723	1007	12109	0	7116	5826
1843	3418	1096	14464	853	6689	7689
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	5794	842	11333	1573	5073	8520
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	2988	959	14138	2360	2728	10296
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	9111	962	13375	9984	1941	12070
1856	10922	979	15249	25269	7728	13138
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	30765	1043	12291	3942	5445	14736
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	37157	1134	12083	30216	7527	15933
1866	37987	1130	13865	26699	4193	15868
1867	31193	1189	13060	37169	4295	15259
1868	23861	980	12550	42080	6752	13216
1869	32725	996	11534	27892	7735	14543
1870	41780	959	11393	32279	6963	17957
1871	53147	894	13540	22210	7075	13244
1872	54155	1028	14767	24783	7855	15810
1873	44723	963	15712	21306	7109	16737
1874	39292	917	16700	21929	6167	17527
1875	38507	1062	16703	68844	12876	18520
1876	48429	1078	15399	78870	12730	18036
1877	77094	1214	16758	41400	11707	19448
1878	51409	1215	16723	73703	10401	19961
1879	38446	1311	17637	87657	10440	19591
1880	35108	1319	19608	70931	11258	20051
1881	45813	1236	20135	81865	11401	20755
1882	43070	1181	19897	107311	12777	20411
1883	42859	1086	17380	85819	14512	19888
1884	43412	1126	20132	103761	15013	21349
1885	43624	1172	23011	102433	13238	22796
1886	54076	1295	23760	120828	13735	24228
1887	32995	1279	21468	125392	14836	25733
1888	35058	1098	21100	102595	14790	24000
1889	49368	1172	24731	76304	15110	25444
1890	38211	1151	21110	94687	16837	27564
1891	28956	989	19568	112385	15948	25277

obs	QM1A	QM2	QM3	QM4A	QM5	QM6
1892	18761	537	19562	112171	12782	24502
1893	38680	487	21133	144404	13814	25076
1894	30555	474	22482	106508	12816	26083
1895	32923	467	22681	137903	17435	26743
1896	35039	423	25005	118794	16578	26440
1897	36323	279	23610	141227	13260	25512
1898	47789	172	19287	69714	13426	26691
1899	33660	130	16719	100455	16370	27220
1900	45098	73	22086	136870	17517	28736
1901	46844	71	25027	92316	18341	28690
1902	54708	61	25524	9170	19444	28862
1903	41615	75	26117	74796	18174	31192
1904	29189	66	24133	89330	25181	32888
1905	42225	64	22237	127167	24244	31757
1906	40567	65	26948	104868	22891	32700
1907	36715	62	28012	26194	24831	33097
1908	41396	28	29802	125302	26065	33258
1909	49967	22	30489	106099	25369	35012
1910	69276	24	32179	82302	26241	32915
1911	43880	24	29625	11939	27327	37223
1912	37161	9	35264	64828	26484	35774
1913	25511	7	33259	174159	30698	38842
1914	6994	4	27990	148022	27306	38069

Volume

obs	QM7A	QM7B	QM8A	QM9	QM10	QM11
1842	934	71	882	338	6	13
1843	1007	85	1284	412	117	24
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	668	36	990	631	289	30
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	1068	119	737	722	386	30
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	1256	158	1255	1757	402	41
1856	1183	192	651	1586	511	18
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	1442	198	1239	1892	952	39
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	1585	217	1334	943	956	24
1866	1700	229	1246	1322	1248	31
1867	1799	235	1265	1373	1492	25
1868	1941	171	1694	1406	1034	25
1869	1697	215	1231	1610	1615	27
1870	2824	259	1354	1595	1725	27
1871	893	160	1237	1950	1846	32
1872	1576	184	1317	1961	1925	16
1873	1582	248	1541	1969	2274	32
1874	1548	246	1459	1640	1992	30
1875	1691	264	1674	2083	2624	29
1876	1777	244	1704	2041	1559	19
1877	1702	262	1953	2681	1629	27
1878	2075	265	1770	2430	2538	19
1879	2098	268	2920	2756	2095	15
1880	1919	253	764	3385	2334	19
1881	2092	276	1416	3310	2889	16
1882	2257	312	1720	3305	2447	12
1883	2246	184	1698	3998	2743	13
1884	2360	241	1626	3744	2875	14
1885	2645	259	1807	4159	2855	14
1886	2634	263	1726	5120	5143	12
1887	2144	281	2123	5032	3921	13
1888	2493	262	2434	5452	4415	17
1889	2341	273	2215	5990	4065	15
1890	2316	291	2067	8232	4040	13
1891	2040	242	1691	7192	3059	11

obs	QM7A	QM7B	QM8A	QM9	QM10	QM11
1892	1956	248	1798	7361	3550	10
1893	2008	274	1838	10952	5107	17
1894	2012	283	1885	10547	4080	18
1895	1974	266	2598	12821	4631	16
1896	2106	274	2346	9863	4151	16
1897	2206	268	2010	13357	4059	16
1898	2434	271	2288	15413	3111	18
1899	2489	265	2576	15672	3981	18
1900	2466	282	2682	15945	3207	22
1901	2662	299	2565	13333	3868	20
1902	2828	291	2416	14939	4503	21
1903	3040	318	3615	14256	4515	21
1904	2943	313	4003	14932	3441	19
1905	2994	307	2444	16061	2476	22
1906	3118	324	1976	13013	1965	22
1907	3203	310	2591	17151	2390	21
1908	3221	300	2341	15543	2005	27
1909	3275	306	3171	14692	2326	26
1910	3198	299	2586	16360	2341	30
1911	2999	289	3057	17941	2485	29
1912	2755	291	2895	18154	2645	42
1913	3160	276	3181	17639	2514	43
1914	2977	252	3476	14757	1658	46

VOLUME

obs	QM12	QM13	QM14	QM15	QM16	QM17
1842	3143	2338	0	0	408	264
1843	4399	2203	0	0	455	128
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	3651	1293	0	0	741	31
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	2740	1098	0	0	702	330
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	2899	1441	2232	0	1390	260
1856	2443	1269	5107	0	1082	302
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	2497	2135	3894	0	840	3365
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	3140	1987	2018	0	713	1270
1866	2176	2126	5402	0	956	2401
1867	4265	1671	4179	0	1265	5285
1868	1817	1408	3805	0	1108	5639
1869	2757	1382	2735	0	871	1854
1870	3434	2016	2882	0	1275	4378
1871	2229	1807	2080	0	1235	4125
1872	2121	2438	3097	0	1285	5362
1873	2883	3040	715	0	1909	4725
1874	2441	2632	1088	0	1159	4162
1875	2891	2216	1215	0	1587	6469
1876	2532	2226	2760	0	1278	2918
1877	2565	2770	3072	0	2149	4969
1878	2829	2830	3127	0	2117	3087
1879	2651	2027	3792	0	1431	8295
1880	2102	1988	1086	0	1722	13341
1881	1463	2023	2939	0	1508	9352
1882	1866	2110	3604	0	1937	16942
1883	1737	1858	3730	0	1708	18115
1884	2399	2125	3988	0	1774	9531
1885	2191	1979	3820	533	1777	19022
1886	2388	2481	5162	3795	2359	31330
1887	2563	2485	4752	1005	2422	18739
1888	2695	2774	4554	2981	2671	15471
1889	3397	2647	4600	2326	2898	17923
1890	2551	2682	5759	2954	3092	18190
1891	2187	2014	7339	4372	3010	13148

obs	QM12	QM13	QM14	QM15	QM16	QM17
1892	1701	2969	8754	3513	2239	13451
1893	2113	2863	9524	3630	2671	10456
1894	2292	3202	9857	3446	2384	9851
1895	1917	2426	12872	6027	2333	16977
1896	2496	3022	15363	6432	2785	13191
1897	2182	2391	9432	9551	2422	8477
1898	2160	2294	15802	23705	3131	8835
1899	2188	2115	13759	26022	3118	13895
1900	2095	2808	16445	28965	3310	12985
1901	2037	3360	12148	44853	3512	13086
1902	2076	3681	19195	62999	3868	10251
1903	2437	3038	19715	67743	4457	14633
1904	1947	2755	20363	68562	4738	9291
1905	1883	1995	19786	77095	5205	14382
1906	1529	2441	20812	100015	5357	14063
1907	1700	2516	23021	123213	5147	10661
1908	1878	2625	23177	124076	5083	12406
1909	1893	2384	20620	102659	5355	14482
1910	1750	3155	22933	151324	6340	11339
1911	1898	3628	30805	142606	5674	16735
1912	1861	3436	23443	133820	6363	15228
1913	1805	2828	26171	104493	6663	15121
1914	1225	2045	22103	97851	3852	8741

VOLUME

obs	QM18	QM19	QM20	QM21	QM22	QM24A
1842	36092	287	0	133	41	1024
1843	33670	406	0	114	40	1513
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	47565	636	0	87	33	2937
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	83008	403	0	45	52	2180
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	87879	519	0	47	235	1521
1856	109624	388	0	60	163	1404
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	100674	257	4	62	1763	1293
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	110652	131	59	103	467	836
1866	165887	184	53	102	903	816
1867	145655	172	51	106	886	1472
1868	197235	158	51	88	656	1203
1869	142747	157	48	94	696	797
1870	187023	145	72	86	419	1574
1871	166381	180	103	102	869	1322
1872	180531	210	83	94	854	1518
1873	260388	407	107	106	737	2032
1874	185567	458	135	80	1757	3651
1875	426223	554	142	112	1478	1930
1876	217656	371	126	122	1704	1687
1877	238711	244	173	153	1891	2154
1878	227972	108	151	127	2595	1500
1879	253340	200	111	148	3519	1900
1880	319234	218	214	139	2690	2231
1881	326407	241	258	101	4673	3215
1882	385783	233	288	101	4637	4143
1883	409727	306	264	101	6246	3080
1884	433761	344	258	114	8084	1995
1885	400638	343	470	124	10320	3549
1886	441776	342	594	141	17852	3416
1887	452100	365	781	147	21432	3184
1888	496225	424	993	149	15888	4300
1889	583507	320	1128	164	18720	3983
1890	628707	375	1124	167	26872	2935
1891	641910	406	910	152	14553	2965

obs	QM18	QM19	QM20	QM21	QM22	QM24A
1892	616756	211	1150	93	9412	4418
1893	539413	308	1489	143	11124	3959
1894	640704	271	1296	122	13387	3719
1895	617391	335	1490	151	10364	3309
1896	627317	337	1517	165	10975	2538
1897	662827	358	1389	157	12013	3488
1898	758654	321	1526	138	9996	3663
1899	775148	350	1678	159	10081	4592
1900	891556	284	1912	238	12424	3832
1901	870415	295	1744	217	13023	3304
1902	968126	319	2009	209	14857	4182
1903	934901	332	1943	224	14816	4318
1904	986388	327	1963	247	16069	3370
1905	957446	381	1848	256	18850	6067
1906	1086511	398	2019	256	22797	5679
1907	1187183	357	1739	233	20261	3826
1908	1186514	317	1632	241	17631	2974
1909	1202633	194	2374	261	19074	3842
1910	1227476	239	2897	265	23132	4380
1911	1181765	242	2770	302	26341	4370
1912	1374006	269	3588	318	31013	9486
1913	1392029	205	3645	274	35873	7276
1914	1211116	174	2420	252	23599	3885

VOLUME

obs	QM25	QM26	QM27	QM28	QM29	QM30
1842	8587	327	131	271	2841	289
1843	10016	414	168	244	3809	466
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	12037	397	186	286	4483	317
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	13501	580	206	434	3716	303
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	16472	601	271	489	4781	350
1856	15212	403	272	479	4398	339
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	30845	759	249	576	4750	420
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	16516	795	303	736	2966	532
1866	17667	689	173	598	3690	491
1867	20029	595	303	1075	4274	468
1868	13027	695	278	721	4059	409
1869	12040	650	291	824	3991	435
1870	15459	809	226	843	4431	434
1871	16276	716	308	1056	4212	499
1872	16427	607	299	919	5276	850
1873	23906	737	416	1135	5480	626
1874	25725	1020	476	1143	5291	646
1875	28314	1067	356	1267	6081	828
1876	18749	729	294	1033	5823	680
1877	20912	718	289	1286	6133	673
1878	28632	1096	390	1254	5772	621
1879	22661	820	407	1214	5289	521
1880	29202	679	273	1582	5321	662
1881	30878	783	342	1842	5642	554
1882	27612	1045	232	1491	4929	518
1883	37938	1015	199	2092	5879	547
1884	46137	886	360	2644	5061	540
1885	39744	1017	510	2644	5485	614
1886	42595	879	334	3223	5901	701
1887	50545	945	368	6348	5976	715
1888	55381	1226	300	4668	5680	760
1889	49535	1589	388	5213	5646	830
1890	43835	1203	347	4984	4986	830
1891	41880	750	365	6635	3975	662

obs	QM25	QM26	QM27	QM28	QM29	QM30
1892	44363	1157	545	5894	1678	291
1893	43197	1337	484	7070	2613	364
1894	38974	1506	435	4000	2347	361
1895	39083	2081	463	6774	2847	411
1896	40204	2223	435	6923	2806	358
1897	38028	1452	368	7286	2494	286
1898	38774	2348	396	8631	2875	263
1899	42356	2329	474	6168	3165	303
1900	40083	2326	502	7416	2855	329
1901	41432	3044	491	8446	2566	357
1902	43923	2287	485	11705	2656	337
1903	49084	4344	589	11267	2819	370
1904	52320	2182	665	12830	2431	333
1905	50842	5890	566	11945	2548	352
1906	54204	2929	593	12537	2723	341
1907	53734	3021	490	12645	2609	330
1908	56584	2791	845	14727	2139	304
1909	55539	3149	702	15359	2344	299
1910	64123	4776	692	17074	2949	303
1911	63928	6816	604	24347	2742	261
1912	73542	2865	571	25323	2678	240
1913	80976	5732	641	24369	2489	241
1914	50642	8082	695	17310	1954	167

VOLUME

obs	QM31	QM32	QM33	QM35
1842	3	0	87	286
1843	3	0	110	245
1844	NA	NA	NA	NA
1845	NA	NA	NA	NA
1846	NA	NA	NA	NA
1847	NA	NA	NA	NA
1848	2	0	38	678
1849	NA	NA	NA	NA
1850	NA	NA	NA	NA
1851	4	0	33	404
1852	NA	NA	NA	NA
1853	NA	NA	NA	NA
1854	NA	NA	NA	NA
1855	24	0	54	543
1856	30	0	70	775
1857	NA	NA	NA	NA
1858	NA	NA	NA	NA
1859	NA	NA	NA	NA
1860	NA	NA	NA	NA
1861	32	4	54	890
1862	NA	NA	NA	NA
1863	NA	NA	NA	NA
1864	NA	NA	NA	NA
1865	32	657	346	1170
1866	32	1107	337	812
1867	35	1411	310	611
1868	34	1771	333	631
1869	31	3421	206	786
1870	33	3801	180	714
1871	35	2711	177	1058
1872	44	3051	274	1408
1873	55	3669	436	2083
1874	51	4367	447	2260
1875	60	2920	356	2669
1876	54	3693	451	5183
1877	68	4949	723	2302
1878	66	5667	933	2398
1879	56	6974	1021	1986
1880	54	6048	927	1954
1881	46	8240	955	2200
1882	48	7878	1071	1622
1883	59	5439	1227	2628
1884	64	9550	1139	3006
1885	118	9078	1350	3184
1886	97	9428	1785	3285
1887	107	9446	2092	4104
1888	117	10385	2271	4598
1889	132	10971	2475	6624
1890	124	12203	3231	7553
1891	93	12442	2857	3924

obs	QM31	QM32	QM33	QM35
1892	47	14174	1232	3571
1893	63	13775	1865	2890
1894	55	14654	663	3209
1895	71	13646	600	3339
1896	76	13173	703	3394
1897	71	14234	715	4274
1898	64	14129	796	5421
1899	70	14970	832	5061
1900	69	13973	707	5616
1901	67	16568	742	5702
1902	68	15051	654	4624
1903	76	17343	700	6148
1904	76	14765	661	6895
1905	94	15995	712	6861
1906	90	16552	617	8504
1907	86	17485	664	9966
1908	77	17507	641	9257
1909	81	17942	668	8207
1910	96	18539	697	8902
1911	87	18758	757	8949
1912	110	18067	785	10406
1913	119	18050	795	13497
1914	120	17023	602	9501

C.5

EXPORTS AND IMPORTS BY COUNTRIES

1 United Kingdom
2 Spain
3 France
4 Italy (1871 borders)
5 Germany (1871 borders)
6 Belgium
7 Holland
8 Sweden and Norway
9 Russia
10 USA
11 Brazil
12 African colonies

obs	XP1	XP2	XP3	XP4	XP5	XP6
1842	2842.2	1105.5	102.5	132.6	92.2	33.2
1843	2896.8	1381.1	70.5	70.2	204.8	3.2
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	3908.9	914.5	35.0	39.6	196.4	33.7
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	3860.3	771.0	41.8	52.9	225.6	69.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	6209.6	1078.5	295.1	66.5	424.2	76.8
1856	6983.8	1297.9	172.9	165.6	425.7	107.9
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	7439.0	1278.6	222.7	139.7	187.1	110.4
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	9413.5	1188.2	363.1	415.3	130.6	91.4
1866	9532.8	1331.1	431.1	222.8	180.3	122.9
1867	8759.1	1137.8	560.1	30.4	260.9	105.3
1868	8660.2	1332.5	615.2	155.9	191.0	139.5
1869	8999.8	1335.6	623.7	193.6	158.6	92.8
1870	12068.4	1846.0	313.8	86.5	174.3	91.4
1871	11386.0	1553.2	551.9	148.7	318.5	192.2
1872	12446.5	1730.3	478.8	157.5	381.7	182.0
1873	13201.0	1821.6	688.2	171.8	285.4	225.9
1874	11262.3	1399.9	628.1	177.8	719.0	369.6
1875	13585.2	1330.9	649.3	85.3	551.9	95.8
1876	10295.3	1313.8	1251.4	107.8	699.6	132.6
1877	11395.9	1384.6	1124.2	149.9	671.6	87.3
1878	9028.0	1203.8	689.9	216.4	416.7	307.1
1879	7817.6	1137.8	880.2	233.2	661.1	404.9
1880	10180.3	1777.9	1201.0	226.2	908.1	320.1
1881	8612.9	1621.1	2593.4	151.0	744.4	281.6
1882	9874.0	1460.9	2762.9	166.4	937.2	212.9
1883	8204.0	1367.3	4945.2	159.5	1025.5	227.9
1884	7549.3	1251.0	5090.4	151.0	1035.3	215.7
1885	6879.8	1245.2	6494.5	151.8	1138.9	260.3
1886	6722.0	1155.7	9490.6	164.1	1317.9	349.4
1887	6763.7	1210.3	4818.0	188.0	1620.3	494.6
1888	7827.9	939.2	5207.4	167.7	1902.6	376.0
1889	8528.2	1105.0	3768.3	197.5	1986.9	469.4
1890	7978.5	879.5	1522.3	221.2	2065.9	504.3
1891	7497.9	887.8	1289.3	179.5	2307.7	441.7

obs	XP1	XP2	XP3	XP4	XP5	XP6
1892	8718.9	1408.7	1015.4	105.3	2220.8	440.3
1893	6552.6	1371.0	906.0	187.0	1960.8	632.0
1894	6691.5	2512.7	756.0	221.2	2053.0	1048.3
1895	7225.7	3227.8	716.8	183.1	2107.7	813.4
1896	7248.7	3166.0	612.0	247.5	2023.3	740.8
1897	7402.8	3926.7	900.2	277.6	2177.2	548.9
1898	8774.2	4054.6	1011.5	326.6	2156.6	750.6
1899	7821.0	3390.9	700.7	297.4	2064.8	675.7
1900	7926.6	4749.1	975.9	252.0	2200.8	845.0
1901	8323.3	4431.8	762.0	289.4	2146.1	819.4
1902	8292.6	4612.1	751.2	325.9	2144.5	715.1
1903	8038.0	5372.4	928.4	378.1	2040.5	747.3
1904	6994.4	6048.2	838.3	309.3	2421.0	865.8
1905	7250.7	4120.2	709.6	354.6	2279.0	826.1
1906	7886.9	5020.9	960.2	521.2	2505.4	934.6
1907	7367.9	4941.0	673.3	503.5	2475.4	936.6
1908	7016.5	5396.6	654.5	486.7	2251.5	894.5
1909	7289.8	5535.7	806.0	470.0	2291.6	938.2
1910	7990.4	5085.3	894.1	515.5	3296.9	1229.2
1911	6935.2	5763.5	1359.0	629.3	3300.2	1110.7
1912	7280.9	5169.8	1675.8	603.9	3000.6	1030.1
1913	7601.3	5479.1	1334.2	579.0	3408.6	1111.2
1914	8246.2	2219.5	1054.1	506.5	1518.8	538.6

obs	XP7	XP8	XP9	XP10	XP11	XP12
1842	125.4	47.8	61.1	90.2	1275.6	86.1
1843	166.8	35.9	320.3	46.3	1050.7	60.9
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	101.3	124.2	268.8	331.0	1473.5	47.2
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	90.0	96.6	230.1	591.6	1689.5	192.4
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	61.3	146.2	2.3	236.4	2960.1	295.7
1856	175.9	132.3	224.7	451.2	3919.1	330.7
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	125.6	161.5	319.6	55.5	2641.0	475.3
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	168.6	132.7	95.6	158.8	2631.8	462.5
1866	180.4	157.5	270.2	194.5	2966.2	531.5
1867	182.6	160.8	415.5	139.9	2580.6	406.0
1868	248.2	168.0	173.5	118.5	2767.2	417.2
1869	219.6	129.2	173.0	158.1	3274.8	555.5
1870	169.5	152.4	221.0	180.9	3174.8	744.0
1871	433.4	131.3	537.9	363.2	3478.6	636.6
1872	393.3	209.8	754.8	203.7	3455.5	586.7
1873	394.7	304.0	448.7	183.3	3547.8	505.1
1874	220.7	468.7	360.1	266.4	4258.0	809.3
1875	167.0	93.8	186.8	376.7	4149.4	1044.9
1876	164.9	151.8	171.0	397.8	3686.6	969.1
1877	115.7	167.2	186.9	346.9	5253.4	722.0
1878	124.2	71.0	109.7	315.4	4195.3	641.4
1879	141.9	147.5	124.4	344.8	4153.4	695.5
1880	253.8	447.0	645.6	609.7	5917.6	698.1
1881	154.4	258.9	343.0	643.5	4472.8	575.6
1882	118.0	225.8	379.2	699.1	4828.8	591.9
1883	113.9	227.9	387.4	660.9	4557.8	592.5
1884	129.4	194.1	366.7	625.5	4098.2	560.8
1885	159.0	208.8	370.7	632.8	4180.4	584.4
1886	206.5	213.4	269.3	646.8	4575.4	539.7
1887	231.1	223.2	318.1	645.8	3686.2	601.5
1888	237.4	299.3	306.3	553.6	4191.6	879.3
1889	277.6	286.9	335.9	509.0	4259.9	1007.1
1890	282.2	187.2	322.6	729.5	5180.6	1119.6
1891	301.2	361.6	284.2	805.9	5274.2	1280.3

obs	XP7	XP8	XP9	XP10	XP11	XP12
1892	329.9	173.2	406.4	900.4	6781.4	1624.0
1893	395.9	219.3	620.7	841.0	7155.3	2061.4
1894	389.5	303.2	735.1	539.2	5994.2	2186.5
1895	623.1	321.9	760.0	475.7	7342.2	2613.5
1896	585.1	333.2	649.6	506.2	6578.5	2871.7
1897	405.2	433.4	924.0	610.3	5630.5	3473.4
1898	424.3	458.4	785.7	479.0	6350.8	4972.5
1899	422.3	491.8	693.6	459.9	5753.3	5479.8
1900	503.5	512.7	763.3	579.4	5537.9	5490.1
1901	534.2	551.6	811.5	611.5	4670.0	3809.7
1902	457.9	498.2	616.4	739.4	5293.8	3340.8
1903	475.5	446.5	931.7	723.3	5078.5	4853.5
1904	429.5	319.4	952.3	595.0	5008.8	5282.2
1905	466.0	318.6	787.1	490.8	5796.6	4837.8
1906	394.4	342.0	929.4	418.7	5391.7	4473.6
1907	498.8	356.7	946.2	551.3	5624.2	4478.0
1908	317.4	363.7	650.9	586.2	4838.5	4078.2
1909	469.4	350.7	688.8	865.2	5145.4	5122.5
1910	718.3	405.6	779.0	1122.4	6460.0	6250.7
1911	755.5	379.1	876.6	841.6	6316.2	4630.7
1912	664.4	397.0	789.8	996.6	6723.5	4833.5
1913	700.6	436.9	939.0	1224.7	6193.2	4950.4
1914	482.6	611.3	485.8	1437.4	3817.2	5132.7

obs	MP1	MP2	MP3	MP4	MP5	MP6
1842	5715.9	200.5	388.7	346.3	287.7	0.3
1843	7442.7	273.5	425.0	300.9	345.1	0.0
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	6388.4	255.4	402.2	46.8	185.2	16.5
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	7097.2	273.6	559.5	100.2	250.3	24.5
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	8876.2	1073.1	1450.6	164.5	580.3	63.9
1856	10240.8	1040.4	1760.6	206.8	296.0	25.4
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	12661.6	2391.7	3035.7	148.5	304.4	90.7
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	11900.3	2010.0	3785.0	63.2	344.5	16.1
1866	12097.3	2348.7	3377.4	65.2	249.4	0.6
1867	11618.3	2349.3	3335.6	159.4	224.5	6.4
1868	10612.1	1574.8	2920.0	135.5	398.6	2.1
1869	10187.8	1904.7	3073.7	206.9	349.5	0.6
1870	11429.8	1821.2	2390.7	133.2	399.7	1.9
1871	12317.0	2039.8	2167.4	99.9	329.8	2.1
1872	13535.2	2749.9	3803.5	29.9	470.2	38.1
1873	14968.3	2491.6	4072.0	85.2	1046.3	140.5
1874	11836.7	2251.7	4400.9	82.3	560.6	64.6
1875	15877.5	2266.3	5868.4	201.0	813.9	351.1
1876	13133.3	2139.0	5460.1	264.3	632.4	559.3
1877	13031.6	2400.0	5160.4	244.8	1123.7	789.7
1878	11528.5	2503.7	4743.1	174.8	1160.2	1094.5
1879	11554.0	2451.5	4264.9	279.3	1628.3	1190.0
1880	12672.0	2085.1	4134.8	400.1	1859.6	821.4
1881	12338.1	2181.8	4392.3	350.4	2520.1	902.9
1882	11835.7	1958.2	4083.0	657.2	2679.1	1004.3
1883	10915.5	1715.3	3898.4	623.7	3212.3	935.6
1884	11392.5	1660.1	4231.5	651.0	3710.7	1041.6
1885	11635.5	1636.5	4484.7	609.7	3754.4	1064.0
1886	12174.4	2593.6	5130.0	799.3	4494.8	1536.8
1887	12250.2	2265.2	4953.5	436.6	4507.8	1522.3
1888	12309.6	2550.7	4986.5	534.7	4706.0	1444.9
1889	13913.7	3289.4	6010.2	675.4	5356.0	1525.8
1890	13263.0	2938.5	6862.2	795.6	6303.1	2246.4
1891	11780.5	2511.1	5320.8	754.4	5162.6	1292.5

obs	MP1	MP2	MP3	MP4	MP5	MP6
1892	9302.8	1700.7	3434.2	788.0	2785.4	888.3
1893	10871.8	2856.8	3825.9	365.2	4439.7	1031.5
1894	9808.9	2960.2	3755.5	551.2	4258.1	1183.4
1895	10911.9	3803.0	4014.4	836.0	5244.0	1232.1
1896	12176.9	3844.1	3858.0	857.6	5624.1	1351.3
1897	11612.0	4210.4	3490.8	400.0	5298.6	1194.0
1898	15577.0	4508.2	4690.4	605.0	6626.4	2234.7
1899	16838.1	3553.3	4351.2	996.0	7263.1	2425.9
1900	19114.2	4597.4	5008.1	822.2	8617.6	2580.4
1901	17646.4	5333.4	5680.4	913.4	8969.7	2403.3
1902	17341.4	6034.6	5677.9	948.1	9220.0	2268.9
1903	17425.6	5400.6	5606.5	1164.7	9884.6	2206.4
1904	18148.8	5648.9	6000.1	1258.0	10454.9	2646.2
1905	17077.3	5222.8	6085.2	1044.2	9607.2	2447.6
1906	17431.2	4300.2	6430.8	1005.7	10285.0	2347.8
1907	18566.8	4115.9	6700.1	1210.5	10974.4	2199.7
1908	17833.5	4832.3	6186.7	1444.7	10325.3	2306.9
1909	17450.6	4263.9	5764.5	1231.8	9986.5	2240.4
1910	19939.3	4711.3	6249.4	1292.1	10585.0	2780.2
1911	19398.5	5105.5	5238.4	1060.1	12127.7	5269.1
1912	21022.6	4480.5	6943.3	1111.0	12432.6	3579.6
1913	23489.6	3843.6	7594.0	1815.8	15840.0	4048.8
1914	21361.9	2124.7	5536.4	798.4	10333.6	2391.1

obs	MP7	MP8	MP9	MP10	MP11	MP12
1842	127.3	263.8	471.1	161.6	1446.9	53.1
1843	197.2	233.7	703.0	195.7	1798.0	40.9
1844	NA	NA	NA	NA	NA	NA
1845	NA	NA	NA	NA	NA	NA
1846	NA	NA	NA	NA	NA	NA
1847	NA	NA	NA	NA	NA	NA
1848	129.1	366.6	485.5	437.5	1643.4	66.5
1849	NA	NA	NA	NA	NA	NA
1850	NA	NA	NA	NA	NA	NA
1851	170.9	306.7	419.2	353.3	1807.4	117.2
1852	NA	NA	NA	NA	NA	NA
1853	NA	NA	NA	NA	NA	NA
1854	NA	NA	NA	NA	NA	NA
1855	131.5	300.9	3.8	391.4	2351.5	312.8
1856	146.5	374.3	290.9	860.4	2730.1	474.2
1857	NA	NA	NA	NA	NA	NA
1858	NA	NA	NA	NA	NA	NA
1859	NA	NA	NA	NA	NA	NA
1860	NA	NA	NA	NA	NA	NA
1861	138.5	492.6	516.3	812.0	3334.6	535.9
1862	NA	NA	NA	NA	NA	NA
1863	NA	NA	NA	NA	NA	NA
1864	NA	NA	NA	NA	NA	NA
1865	242.3	667.6	698.0	709.1	3003.3	536.6
1866	237.5	473.2	528.2	502.9	3409.4	766.8
1867	394.4	608.8	2324.6	588.9	3025.1	705.0
1868	382.1	478.1	2247.2	899.7	2808.1	682.9
1869	322.3	395.1	987.8	1130.9	2880.5	556.9
1870	398.7	478.3	1199.9	1690.8	3164.0	895.1
1871	415.5	442.1	820.0	1506.6	2409.2	460.0
1872	437.8	513.2	479.6	1210.4	2994.4	722.0
1873	382.9	692.6	899.3	941.1	3196.9	745.2
1874	722.7	773.3	692.1	1285.6	3160.8	814.1
1875	435.2	731.7	1197.8	2305.2	2481.1	753.1
1876	297.9	924.0	544.9	3191.6	1924.7	788.4
1877	249.5	1214.6	509.4	2146.9	2625.4	747.3
1878	321.0	1361.5	531.7	2266.1	2176.0	378.0
1879	409.9	904.1	545.4	5989.2	2051.7	685.8
1880	274.9	1212.2	516.3	5297.2	2126.3	616.7
1881	383.0	766.7	513.2	5444.3	2384.6	716.0
1882	255.3	742.1	748.0	5653.5	2316.9	665.1
1883	311.9	686.1	467.8	4989.9	2027.2	623.7
1884	423.2	748.7	325.5	4882.5	1953.0	683.6
1885	478.0	793.4	276.5	4624.5	1922.4	726.3
1886	423.1	741.2	470.7	4978.1	2013.7	791.0
1887	374.6	876.2	499.6	5307.0	1874.0	701.6
1888	368.7	982.8	856.8	4483.8	2148.2	766.0
1889	347.6	1351.3	1084.6	3665.2	1803.3	735.2
1890	416.9	1235.5	447.6	5148.1	1945.7	767.5
1891	409.1	1102.6	757.2	5252.5	2054.2	899.9

obs	MP7	MP8	MP9	MP10	MP11	MP12
1892	328.2	817.3	267.2	6037.9	1911.1	848.8
1893	361.8	1464.9	407.8	7290.8	2428.2	926.1
1894	266.6	1375.2	229.1	5761.1	2483.6	988.2
1895	260.1	1126.7	583.7	6814.5	2021.7	1060.0
1896	249.3	1019.3	1985.5	4420.7	1624.4	1057.6
1897	289.4	1241.0	3267.5	4615.6	1945.1	979.7
1898	369.7	1250.2	649.9	7042.7	1956.0	1139.3
1899	508.9	875.9	1084.4	8060.2	1459.4	1159.6
1900	519.9	1153.1	710.8	8962.4	2873.8	1498.5
1901	700.8	1718.6	690.0	7550.2	2035.9	1350.4
1902	840.9	1249.7	679.2	3988.9	2857.1	1560.2
1903	734.4	1281.1	881.6	6169.5	3092.4	1700.3
1904	870.4	1344.3	1947.1	4425.1	2127.2	1827.2
1905	867.1	1574.4	3134.5	3468.2	1972.5	1839.9
1906	904.0	1691.3	1299.6	4682.0	1965.3	1623.0
1907	1031.8	1760.6	523.0	6063.7	1847.6	1959.8
1908	1214.3	2078.5	566.5	7238.4	1309.0	2099.6
1909	1131.4	2143.5	749.4	6918.1	1307.1	2108.8
1910	1354.5	1995.0	2528.4	7428.0	1149.0	2589.7
1911	1815.6	2037.9	560.6	5835.4	1853.6	2562.4
1912	1577.7	2956.3	1093.1	7979.5	1299.6	1881.2
1913	1788.8	2977.7	883.8	9892.0	1651.2	2793.0
1914	1527.6	2903.8	800.8	8982.2	2166.8	3080.9

C.6

REEXPORTS

RX - Total reexports

RXUK - Reexports to the United Kingdom
RXFRA - Reexports to France
RXAL - Reexports to Germany
RXBEL - Reexports to Belgium
RXAF - Reexports to the African colonies

RMUK - Reexports from the United Kingdom
RMFRA - Reexports from France
RMAL - Reexports from Germany
RMBEL - Reexports from Belgium
RMAF - Reexports from the African colonies

Reexports - Destinations

(Contos)

obs	RX	RXUK	RXFRA	RXAL	RXBEL	RXAF
1842	773.5	NA	NA	NA	NA	NA
1843	1083.3	NA	NA	NA	NA	NA
1848	1227.4	NA	74.8	NA	NA	NA
1851	1566.5	634.2	89.0	45.9	NA	519.5
1855	1616.2	888.1	229.0	196.7	NA	397.4
1856	2366.3	391.9	160.8	11.7	0.1	733.6
1861	2014.2	187.9	88.3	7.6	0.0	771.8
1865	2952.4	507.0	474.8	15.7	0.4	944.8
1866	2925.1	589.5	360.9	6.9	0.3	1041.0
1867	2859.3	543.6	299.0	49.7	0.0	744.6
1868	3021.8	510.3	363.3	118.2	0.8	922.8
1869	3495.9	492.5	542.5	72.5	0.0	1250.9
1870	2745.9	423.7	132.0	1.8	0.3	1010.5
1871	3539.8	650.7	437.7	192.3	0.0	1247.4
1872	4306.6	907.5	364.4	342.7	0.3	1474.1
1873	3514.5	699.0	403.5	211.5	3.0	1142.9
1874	3882.8	952.2	395.0	195.2	5.5	1131.7
1875	3563.7	518.2	670.9	282.6	7.4	1069.1
1876	3367.6	506.7	612.4	225.6	0.4	1218.7
1877	2766.3	414.4	492.8	297.9	0.0	867.7
1878	2057.9	362.7	302.1	141.1	10.8	742.7
1879	2400.2	523.8	306.3	127.4	4.0	838.7
1880	3363.5	NA	NA	NA	NA	NA
1881	3999.3	NA	NA	NA	NA	NA 1211.8
1882	3616.7	NA	NA	NA	NA	NA 1079.0
1883	3694.0	NA	NA	NA	NA	NA
1884	3989.5	NA	NA	NA	NA	NA
1885	3022.2	NA	NA	NA	NA	NA
1886	3279.7	NA	NA	NA	NA	NA
1887	4235.8	704.6	144.1	959.9	190.3	1377.1
1888	5524.1	623.7	132.0	1660.0	152.6	2001.3
1889	6982.2	1026.2	292.9	1788.5	129.2	2338.8
1890	6936.5	655.3	284.9	1853.4	201.7	2223.5
1891	7455.6	1076.7	468.8	1607.0	134.1	2668.8
1892	8743.8	NA 1130.2	NA 367.6	NA 2793.7	NA 155.5	NA 2137.9
1893	9914.4	697.2	333.5	3097.1	204.5	2951.8
1894	10452.1	1419.6	429.9	2395.6	229.4	2531.6
1895	9074.4	1602.7	306.9	2451.4	155.6	1925.2
1896	8173.9	1662.7	369.5	2364.6	235.9	1516.4
1897	8712.9	1599.1	272.2	2402.7	207.9	1626.5
1898	12083.7	2354.2	451.4	3219.6	445.2	2006.7
1899	13819.4	3901.2	244.0	3573.2	611.0	2001.4
1900	13381.5	3684.2	130.4	2987.4	492.3	2462.8
1901	13560.8	4021.2	211.9	2763.5	498.3	1690.9
1902	12178.7	2894.1	168.3	2909.6	506.0	1400.8
1903	15162.0	3646.7	528.0	3572.2	649.1	1629.7
1904	15672.3	4047.2	273.0	4175.9	711.8	2020.0
1905	14664.1	3808.9	325.2	4410.7	581.7	1800.5
1906	15525.1	3366.0	232.2	3810.4	481.7	2008.3
1907	15389.6	3851.6	367.6	3698.0	451.0	2674.1

obs	RX	RXUK	RXFRA	RXAL	RXBEL	RXAF
1908	16014.1	2401.9	308.5	3756.3	559.8	3033.5
1909	17722.3	1692.5	415.8	4428.7	918.9	3099.1
1910	21135.1	1335.0	691.0	4942.8	1406.7	3136.8
1911	19376.7	1178.0	456.7	4531.8	1513.6	NA
1912	22458.9	979.7	380.0	5072.5	1619.7	NA
1913	18145.9	925.3	303.2	3086.4	1027.4	NA
1914	18355.5	968.7	171.5	2058.5	802.6	NA

REEXPORTS - ORIGINS
(CONTOS)

obs	RX	RMUK	RMFRA	RMAL	RMBEL	RMAF
1842	773.5	NA	NA	NA	NA	NA
1843	1083.3	NA	NA	NA	NA	NA
1848	1227.4	337.5	10.9	12.4	1.3	216.5
1851	1566.5	471.6	33.1	20.4	5.9	360.6
1855	1616.2	428.8	42.7	24.5	1.1	712.6
1856	2366.3	758.4	27.2	31.2	7.8	655.4
1861	2014.2	784.6	55.0	55.0	2.9	408.4
1865	2952.4	961.7	129.9	25.5	1.6	929.6
1866	2925.1	1040.7	200.5	37.8	0.3	767.1
1867	2859.3	785.0	161.8	28.0	1.1	808.6
1868	3021.8	859.9	172.3	80.2	0.3	969.7
1869	3495.9	1165.2	156.2	124.8	0.3	1373.3
1870	2745.9	1176.5	183.0	26.1	0.0	601.8
1871	3539.8	1104.9	100.3	190.3	1.4	1396.5
1872	4306.6	1367.4	195.5	89.9	15.4	1949.2
1873	3514.5	984.6	117.9	48.9	9.8	1648.5
1874	3882.8	975.6	108.9	90.6	35.6	1852.9
1875	3563.7	736.7	176.2	235.2	22.4	1775.5
1876	3367.6	896.2	53.5	229.9	35.7	1413.7
1877	2766.3	812.8	45.7	154.4	0.5	1394.3
1878	2057.9	605.4	155.8	129.5	14.1	831.5
1879	2400.2	832.4	70.6	105.4	27.4	933.0
1880	3363.5	NA	NA	NA	NA	1372.5
1881	3999.3	NA	NA	NA	NA	NA
1882	3616.7	NA	NA	NA	NA	NA
1883	3694.0	NA	NA	NA	NA	NA
1884	3989.5	NA	NA	NA	NA	NA
1885	3022.2	NA 1138.2	NA 88.3	NA 120.4	NA 59.6	NA 1406.8
1886	3279.7	NA 1118.0	NA 101.4	NA 163.1	NA 26.8	NA 1687.4
1887	4235.8	1469.5	102.6	145.9	61.7	2254.8
1888	5524.1	1999.6	148.0	198.9	106.9	2704.3
1889	6982.2	2243.6	209.9	249.3	101.1	3693.0
1890	6936.5	1983.1	237.7	305.2	128.8	3836.9
1891	7455.6	2250.1	251.7	335.8	128.3	3920.4
1892	8743.8	NA 2000.4	NA 150.0	NA 273.0	NA 103.4	NA 3951.
1893	9914.4	2576.3	184.9	427.6	153.2	6146.0
1894	10452.1	2053.7	172.2	505.3	83.2	7123.8
1895	9074.4	1600.2	184.1	404.5	66.8	6301.0
1896	8173.9	1337.0	163.9	305.0	57.7	5860.1
1897	8712.9	1533.4	148.9	234.1	68.9	6291.0
1898	12083.7	1990.0	185.0	322.5	164.2	8864.7
1899	13819.4	2120.3	168.1	419.4	238.9	10382.5
1900	13381.5	2901.4	185.8	404.7	233.2	9064.8
1901	13560.8	2680.3	203.4	410.5	119.8	9496.3
1902	12178.7	2824.0	147.6	362.1	70.5	7957.3
1903	15162.0	2581.3	166.6	411.5	95.6	10866.6
1904	15672.3	2512.6	173.7	557.1	120.1	11174.8
1905	14664.1	1963.0	176.6	546.6	75.6	10810.6
1906	15525.1	2161.1	272.0	627.2	45.5	9388.9
1907	15389.6	2479.8	239.7	966.4	86.9	10499.9

obs	RX	RMUK	RMFRA	RMAL	RMBEL	RMAF
1908	16014.1	2230.7	221.2	1423.2	103.0	10791.3
1909	17722.3	2459.0	176.2	1598.7	122.6	12298.5
1910	21135.1	2430.8	174.4	1496.4	169.3	15701.7
1911	19376.7	1986.9	215.0	3132.4	245.0	12675.6
1912	22458.9	2677.4	228.4	2319.7	184.1	15604.8
1913	18145.9	2592.7	226.2	2566.0	117.3	10843.7

Reexports - Correction (contos)

obs	RXOFF	RXHIDE	RX
1842	636.2	137.3	773.5
1843	1035.2	48.1	1083.3
1848	1181.5	45.9	1227.4
1851	1538.6	27.9	1566.5
1855	1567.4	48.8	1616.2
1856	1710.9	655.4	2366.3
1861	1605.8	408.4	2014.2
1865	2022.8	929.6	2952.4
1866	2158.0	767.1	2925.1
1867	2050.7	808.6	2859.3
1868	2052.1	969.7	3021.8
1869	2122.6	1373.3	3495.9
1870	2144.1	601.8	2745.9
1871	2143.3	1396.5	3539.8
1872	2357.4	1949.2	4306.6
1873	1866.0	1648.5	3514.5
1874	2029.9	1852.9	3882.8
1875	1788.2	1775.5	3563.7
1876	1953.9	1413.7	3367.6
1877	1372.0	1394.3	2766.3
1878	1226.4	831.5	2057.9
1879	1467.2	933.0	2400.2
1880	1991.0	1372.5	3363.5

RXHIDE - Reexports registered as exports

RX - Corrected reexports (= RXOFF + RXHIDE)

RXOFF - Official data

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